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627.8 Missouri (Toston)  
N7btd Dam emergency  
1988 action plan

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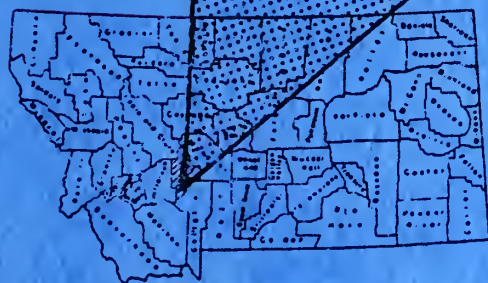
# BROADWATER- MISSOURI (TOSTON) DAM EMERGENCY PLAN

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ENGINEERING BUREAU

November 1987

Revised December 1, 1988



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Verification:

STATE OF [ MONTANA ],

County of [Lewis and Clark ] ss:

The undersigned, being duly sworn, states that (he, she) has read the following document and knows the contents of it, and that all of the statements contained in that document are true and correct, to the best of (his, her) knowledge and belief.

Richard L Bondy  
Name of person signing

CHIEF, ENGINEERING BUREAU  
Title

STATE OF MONTANA )

County of Lewis and Clark )

On this 22nd day of September, 1987, before me a Notary Public for the State of Montana, personally appeared Richard L. Bondy, known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year first above written.

Notary Public for the State of  
Montana. John K. Kim  
Residing at \_\_\_\_\_  
My Commission expires \_\_\_\_\_

NOTARY PUBLIC for the State of Montana  
Residing at Helena, Montana  
My Commission Expires August 1, 1989



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# **BROADWATER-MISSOURI (TOSTON) DAM**

## **EMERGENCY ACTION PLAN**

Project No. 2853

Engineering Bureau  
Water Resources Division  
Montana Department of Natural Resources  
and Conservation  
1520 East Sixth Avenue  
Helena, Montana 59620-2301

November 1987



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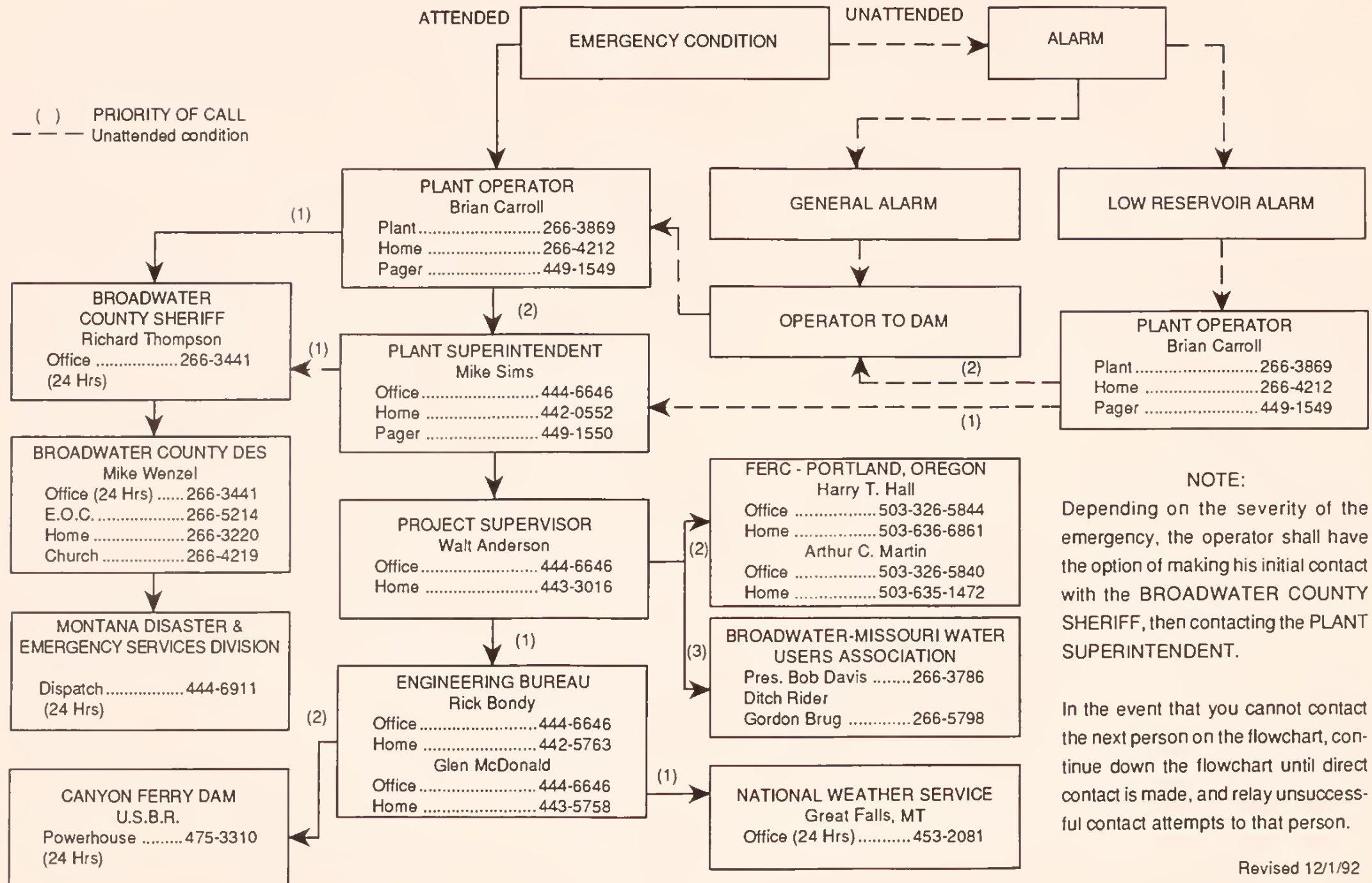
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# I. NOTIFICATION FLOWCHARTS

## A. FAILURE IS IMMINENT OR HAS OCCURRED

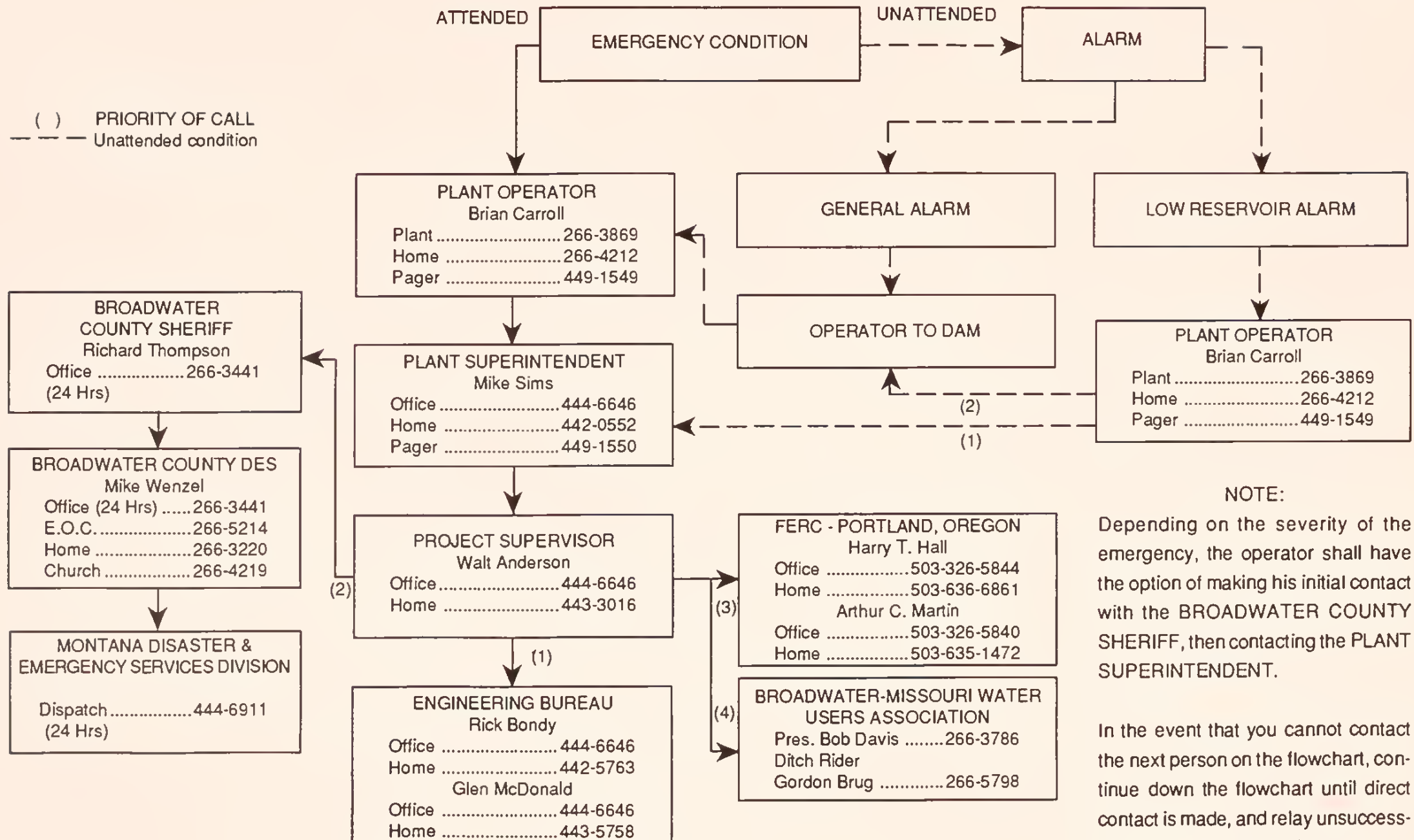
### NOTIFICATION FLOWCHART BROADWATER-MISSOURI DAM







# B. POTENTIALLY HAZARDOUS SITUATION IS DEVELOPING NOTIFICATION FLOWCHART BROADWATER-MISSOURI DAM



## NOTE:

Depending on the severity of the emergency, the operator shall have the option of making his initial contact with the BROADWATER COUNTY SHERIFF, then contacting the PLANT SUPERINTENDENT.

In the event that you cannot contact the next person on the flowchart, continue down the flowchart until direct contact is made, and relay unsuccessful contact attempts to that person.



2. A potentially hazardous situation is developing.

This plan is intended to provide instructions for notifying the proper authorities of a problem at the dam and is not intended to be an evacuation plan for notifying and evacuating downstream residences. The notification and evacuation of downstream residences is the responsibility of the Broadwater County Sheriff's Office.

It is emphasized that the probability of an emergency of the magnitude considered in this plan is extremely remote, and issuing this plan does not imply that we have concerns over the integrity of the project. The dam is inspected regularly by Engineering Bureau personnel.

Appendix G, Dam Safety Problems lists conditions of possible concern to the safety of the dam. There is a description of the problem, how to evaluate the problem, action to be taken to alleviate the problem, who to notify, and the probable cause. The Engineering Bureau will advise the dam tender concerning action to be taken.

Norman Barnard is the department EAP coordinator. It is his responsibility to see that the EAP is tested on an annual basis and updated. He will arrange for the annual training seminar for the plant operators, local Disaster and Emergency Services (DES) personnel, and law enforcement personnel.





### III. NOTIFICATION PROCEDURES

#### A. FAILURE IS IMMINENT OR HAS OCCURRED

##### 1. Responsibilities of the Dam Operator

If Broadwater-Missouri Dam is failing, two things must be undertaken immediately: (1) the floodplain downstream from the dam must be evacuated, and (2) any steps that might save the dam or reduce damage to the dam or floodplain should be taken. (Refer to the maps in Appendix C to determine the areas that are likely to be inundated if the dam fails.) The evacuation will be handled according to the county warning plan; the dam will be managed by the Engineering Bureau of the Department of Natural Resources and Conservation, with your assistance. As dam operator, it is your responsibility to contact the Broadwater County Sheriff's Office (266-3441) as soon as you are aware of the danger. That and your other responsibilities are listed in **Table 1** on page 8.

It is extremely important that you accurately judge whether the dam is about to fail. If you aren't sure whether the dam is threatened, call the Engineering Bureau (444-6646) for a decision on whether to begin the emergency procedures listed in **Table 1** on page 8.

## **TABLE 1**

### **THE DAM OPERATOR'S RESPONSIBILITIES**

1. Call the Broadwater County Sheriff's Office (266-3441). Be sure to say, "This is an emergency." The Sheriff's Office will call the Broadwater County Disaster and Emergency Services at the Emergency Operations Center (EOC) 266-5214 or 266-3443 and the Engineering Bureau (444-6646).
2. Do whatever is necessary to bring anyone in immediate danger (someone on the dam, or directly below the dam, or boating on the reservoir, for instance) to safety.
3. Keep in frequent touch with the Engineering Bureau. The engineers there will tell you how to handle the emergency.
4. If all means of communication are lost: (1) try to find out why, (2) try to get to another telephone that works, or (3) get someone else to try to reestablish communications. If these means fail, handle the immediate problems as well as you can, and periodically try to reestablish contact with the Engineering Bureau.

## 2. Responsibilities of the Engineering Bureau

The engineer who receives the call that Broadwater-Missouri Dam is failing or is about to fail has the responsibility of: (1) finding out how serious the danger is, and (2) notifying the key people within DNRC who will be needed to handle the emergency. (See Blue Telephone Directory on page 27.)

Ask the person who phones in the warning as many questions as you need to assess the risk of failure (see **Table 2** for a list of possible questions). If you think failure is not imminent, one of the sets of procedures in the "Reporting Unusual Occurrences" section of this book may be appropriate, rather than the emergency procedures listed in **Table 3** on page 11. But if the dam is indeed in danger of failing, begin the steps listed in **Table 3** on page 11 at once.

Refer to the maps in Appendix C beginning on page C-2 to determine the areas that are likely to be inundated if the dam fails. If evacuation of downstream residents is necessary, the Broadwater County Sheriff's Office will direct the evacuation. But you should call the EOC **(266-5214)** frequently during the emergency to keep county officials informed of the condition of the dam and the amount of flooding.

## TABLE 2

### WHAT TO ASK THE DAM TENDER

- Has the dam failed? If so, when did it fail?
  
- What is the rate of failure? How big is the failure site, and where is it? How good is the access to the site? Are there any alternative access routes?
  
- Who else have you notified? The Broadwater County Sheriff's Office (Broadwater County Disaster and Emergency Services)?
  
- If the dam is not failing, what is the problem? What caused it? Where is it? When did you notice the problem, and when did it start?
  
- What is the weather like now? What has it been like for the past couple of days? What is the forecast for the near future?
  
- If there is a discharge of water through an abutment, where is it? How much water is seeping through, and what color is it?
  
- Where are you calling from? How can we get in touch with you? When will you call again?
  
- Are the control gates operable? Are they open or closed?



## TABLE 3

### WHAT THE ENGINEERING BUREAU SHOULD DO

1. Get as much information as possible from the initial caller (see **Table 2**), and decide whether the dam is failing or is about to fail. If it is about to fail, continue with the following steps. If it is not, then one of the procedures in the "Potentially Hazardous Situation Is Developing" section beginning on page 13 probably would be more appropriate.
2. If the person phoning in the warning isn't the dam tender, call the dam tender at once **(266-5798)**. Attempt to verify the authenticity of the report if you question it. Then call the Broadwater County Sheriff's Office **(266-3441)** if the dam tender hasn't already called them. If the dam tender has, keep in touch with the county authorities and with the dam tender throughout the emergency. Be sure to say to everyone you call, "This is an emergency."
3. Call as many Engineering Bureau and DNRC employees to help handle the emergency as you think you need (phone numbers on pages 28, 29, and 30).

4. Arrange for Engineering Bureau representatives to inspect the dam immediately. Providers of private emergency transportation equipment are listed on page 31. Also, keep Broadwater County Disaster and Emergency Services informed of the situation.
5. Arrange for Engineering Bureau representatives to be stationed at: (1) the dam, (2) the Broadwater County Emergency Operations Center, (3) the State Disaster and Emergency Services office, and (4) the Engineering Bureau office.

## **B. POTENTIALLY HAZARDOUS SITUATION IS DEVELOPING**

An unusual occurrence is an event or condition not normally encountered in the routine operation of the dam and reservoir. Among the unusual occurrences that may affect the dam are dam problems, failure of the spillway or outlet works, heavy precipitation or rapid spring snowmelt, landslides, earthquakes, erosion, theft, vandalism, acts of sabotage, and serious accidents or fatalities. These occurrences may endanger the dam, the public, or the downstream valley and may necessitate a temporary or permanent revision of the dam's operating procedures.

This section of the Broadwater-Missouri (Toston) Dam Emergency Action Plan tells you how to notify the Engineering Bureau—and, in some cases, who else to notify—if an unusual occurrence takes place. Notify the bureau by the fastest means available—usually by phone.

The following pages list different conditions and problems that could occur at the dam, with information on what actions the dam tender should take.

### **1. DAM PROBLEMS**

If you discover an unusual condition  
of the dam that could  
threaten the structure:

You should telephone the Engineering Bureau at **444-6646** immediately--call the engineers at home if there's no answer at the bureau office. (See phone numbers on page 28.) Among the conditions you should watch for are sloughing, cracking, or settlement; slides; development of sinkholes or scarps; appearance of seepage on the dam face; damage to riprap; whirlpools in the reservoir; boils downstream; change in seepage discharge or color; misalignment of the dam structure; vegetation changes; movement of material along concrete structures; unusual change in piezometer levels; and movements of the slope inclinometer tube.

When you call the Engineering Bureau to report a slide, slough, or sinkhole, be prepared to report:

- 1) its location
- 2) its size
- 3) its rate of growth
- 4) its effects on adjoining structures
- 5) the reservoir water surface elevation
- 6) weather conditions
- 7) amount of damage
- 8) any seepage or wetting--if there is any, estimate its flow rate
- 9) any other pertinent information





1. Engineering Bureau Personnel (see telephone Directory in Appendix G)  
and

Dam Safety Section	Office	444-6613
Mike Oelrich	Home	449-5668
Gary Fischer	Home	442-8818
Water Resources Division	Office	444-6601
Gary Fritz	Home	443-3631

2. National Weather Service 453-2081 (24 hrs)
3. Canyon Ferry Power Plant Operator 475-3310 (24 hrs)

B. Failure is imminent or has occurred - Unattended Condition.

When the dam is unattended, the Operating Personnel are warned of an emergency condition, either by a low reservoir level alarm or by a general plant shutdown alarm. The Plant Operator's response to the two alarm conditions is outlined below.

When the Plant Operator is on vacation or leave, then the Plant Superintendent assumes the Plant Operator's duties, as well as his/her own duties. When the Plant Superintendent is on vacation or leave, then the Project Supervisor assumes the Plant Superintendent's duties, as well as his/her own duties. When the Project Supervisor is on vacation or leave, then the Plant Superintendent assumes the Project Supervisor's duties, as well as his/her own duties.

When the Plant Operator receives a low reservoir level alarm, he/she shall:

1. Notify the Plant Superintendent  
Mike Sims 449-1550 pager (24 hrs)  
444-6646 office  
442-0552 home

- 10) the effect of the water jet exiting the spillway on the surrounding channel, the stilling basin, and any nearby structures

### **3. FAILURE OF OUTLET WORKS**

#### **If the outlet works stop working**

First, try to find out at once why the outlet works won't work. It may be because of one of these malfunctions:

- 1) blocking of the inlet by debris, sediment, dam embankment failure, or riprap failure
- 2) collapse of conduit
- 3) damage to gates
- 4) broken winch or damaged gears
- 5) broken cable
- 6) blocking of outlet
- 7) water or debris in bottom of towers
- 8) binding of gates

Then, call the Engineering Bureau at **444-6646** immediately. If you were able to find out why the gates won't work, tell the bureau. The engineers will tell you what to do next. The outlets are plugged at Broadwater-Missouri Dam.

## 4. FLOODING

If it appears likely the water levels will rise above normal

You should immediately call the Engineering Bureau at **444-6646**.

Be prepared to tell the engineers the following:

- 1) current reservoir water surface elevation
- 2) observed rate at which the water surface is rising
- 3) weather conditions (current and predicted)
- 4) the flow of the river above and below the reservoir

The bureau will tell you how to operate the reservoir and when to make further reports.

If, because of heavy rain or heavy runoff from snowmelt, it appears that unusually large spilling from the reservoir will occur (spilling that will cause the river below the reservoir to exceed its banks), you should immediately notify the Engineering Bureau. The bureau will tell you which local authorities to notify; telephone numbers for all local authorities are listed on page 28.

## 5. LANDSLIDES

If you discover a sizable land movement toward or into the reservoir



Call the Engineering Bureau at **444-6646** immediately. Be prepared to report:

- 1) the land movement's size
- 2) its location
- 3) weather conditions
- 4) how the reservoir was being operated before the movement was discovered

Be alert for possible danger to people near the slide or around or below the reservoir.

From the time you first detect movement in an area, keep careful records of further slides. Check those areas frequently (the bureau will help you decide how frequently they should be checked), noting any changes.

At least once a year, you should examine the shoreline of the entire reservoir. Take photos where you suspect earth movement or where it is obvious; try to take subsequent photos from the same vantage point. (Comparing the photos will be a convenient way of detecting changes in a slide area.) These annual inspections should include the downstream area for about 2 miles from the dam. Watch for slides or seeps. Report any land movement to the Engineering Bureau immediately.



## 6. EARTHQUAKES

If you feel an earthquake or hear  
that one has occurred in your area

- 1) Inspect the dam immediately.
- 2) If the dam is so badly damaged that it may fail, immediately begin the "Failure is Imminent or Has Occurred" procedures starting on page 7.
- 3) If the dam has been damaged, but not badly enough to cause it to fail, do the following at once.
  - a) Inspect the damage more closely; note its location, extent, and nature.
  - b) Even if it still appears that the dam is in no imminent danger of failure, call the Engineering Bureau at **444-6646** and make a complete report. Make sure that the person receiving your report understands your evaluation of the potential hazard at the dam. Stay in frequent contact with the bureau; bureau staff may tell you to contact local officials or take other emergency steps. The Engineering Bureau will notify the Broadwater County Sheriff's Office of the situation.

- 4) Inspect the dam and abutments more closely for possible sloughs, displacement, cracks, or seeps. Observe the flow of water in toe drains, noting turbidity and rate of flow.
- 5) Inspect the outlet works, control house, and gate chamber. If you find any damage, stop releasing water and notify the Engineering Bureau at once.
- 6) Inspect the spillway bays for damage.
- 7) Whether you find damage or not, call the bureau and report.

The National Earthquake Information Service (NEIS) of the U. S. Geological Survey (USGS) in Denver notifies the Engineering Bureau of earthquakes occurring in Montana or Wyoming according to this schedule:

<u>Magnitude (Richter)</u>	<u>Regional Office Notification Schedule</u>
3.5 to 4.5	The next working day
4.6 and above	Immediately

The bureau will notify you of any earthquake within a 200-mile radius of Broadwater-Missouri Dam.

The dam is located at Latitude 46° 07.2' and Longitude 111° 24.5'.

(NEIS Telephone Number: 1-303-234-3994)

## 7. THEFT

If any state property at the  
dam is stolen:

First call the Broadwater County Sheriff's Office **2(66-3441)** and then the Engineering Bureau **444-6646)**. If the loss is serious enough to threaten the dam or necessitate changes in its operation, follow the steps listed below for vandalism.

## 8. VANDALISM

If any state property at  
the dam is vandalized

First call the Broadwater County Sheriff's Office **2(66-3441)** and then the Engineering Bureau **444-6646)**. If the damage is serious enough to threaten the dam or necessitate changes in its operation, do anything you feel necessary to protect the dam or any endangered people. In your call to the Engineering Bureau, give as much information as you can. The following is a list of helpful information:

- 1) when the incident happened
- 2) when it was discovered
- 3) what changes in dam operation will be necessary until repairs are made
- 4) how much you estimate repairs will cost
- 5) what actions you have already taken or plan to take

## 9. SABOTAGE

One small bomb, strategically placed, could cause a great deal of damage and inconvenience even though it might not endanger the dam itself. So be alert for suspicious behavior near the dam or any associated structures, and keep an eye out for suspicious objects. Lock all buildings and mechanisms, and check the locks frequently to make sure they're in good condition.

### If you receive a bomb threat

#### by telephone:

- 1) Keep the caller on the line as long as possible. Ask him to repeat the message.
- 2) If he doesn't say where the bomb is or when it will go off, ask him.
- 3) Tell him that the explosion of a bomb at Broadwater-Missouri Dam could kill or injure innocent people.
- 4) Listen for background noises—motors running, background music (what type?)—that might give even a remote clue about where the call is being made.
- 5) Listen closely to the voice. Is it male or female? What can you tell about its quality, accents, or impediments?

As soon as the caller hangs up, call first the Broadwater County Sheriff (266-3441) and then the Engineering Bureau 444-6646). You



will be told by the County Sheriff whether to conduct a search for the bomb or not. If you do search, and you discover a suspicious object, don't touch it or disturb it or allow anyone else to do so. Handling of bombs is best left to professionals who are trained in disposal of explosives. Any recreationist in the vicinity of the object should be told to move immediately; if it is necessary to evacuate residences, that evacuation will be carried out by the Broadwater County Sheriff's Office 266-3441).

If you receive a bomb threat  
in the mail:

Call first the Broadwater County Sheriff 266-3441) and then the Engineering Bureau (444-6646). If you are told to conduct a search, follow the instructions given above for a telephoned bomb threat. In any event, remain near the dam to assist in the search.

If a bomb explodes near the dam,  
reservoir, or any associated facility

Immediately inspect the damage. Then call first the Broadwater County Sheriff (266-3441) and, second, the Engineering Bureau (444-6646). Bureau staff will tell you what to do next. Keep Broadwater County Disaster and Emergency Services informed at all times (266-5214).

## **10. FATALITIES OR SERIOUS ACCIDENTS**

If you learn of any drownings or  
other fatalities or any accidents  
causing personal injury

If you are among the first on the scene, see that first aid is administered, if necessary, and send for help—the Broadwater County Sheriff's Office should be notified immediately at **266-3441**. Then call the Engineering Bureau **444-6646**).

## **11. POSTING OF THE NOTIFICATION FLOWCHART AND DISTRIBUTION OF EAP**

See Appendix D, page D-3.





# **TELEPHONE DIRECTORY**

## C. TELEPHONE DIRECTORY

The telephone numbers are listed in order of priority.

### 1. SHERIFF

Broadwater County. . . . . 266-3441  
Lewis & Clark County . . . . . 442-7880

### 2. DISASTER AND EMERGENCY SERVICES

Broadwater County. . . . . Business 266-3443  
Ray Doggett . . . . . EOC 266-5214  
Home 266-3937  
Montana Disaster and Emergency Services  
Division (Helena) . . . . . 444-6911  
Lewis & Clark County . . . . . 443-1010

### 3. MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION (DNRC)

Engineering Bureau . . . . . Office 444-6646  
Bureau Chief: Richard Bondy. . . . . Home 442-5763  
Supervisor, Project Rehabilitation Section:  
Glen McDonald . . . . . Home 443-5758  
Dam Safety Engineer: Arthur Taylor . . Home 443-0315  
Civil Engineer: Robert Clark . . . . . Home 449-3568  
Civil Engineer: Norman Barnard . . . . Home 443-5665  
Supervisor, Project Section:  
Steven Fry . . . . . Home 443-5043  
Civil Engineer: Lawrence Tegg . . . . . Home 442-4835  
Civil Engineer: Walt Anderson . . . . . Home 443-3016  
Water Resources Division . . . . . Office 444-6601  
Administrator: Gary Fritz . . . . . Home 443-3631  
Assistant Administrator: Laurence Siroky Home 442-2806  
Assistant Administrator: Robin Harper . Home 227-5982  
Department Director . . . . . Office 444-6699  
Karen Barclay . . . . . Home 442-0329  
Information Officer: James Bond . . . . Office 444-6743  
Power plant at the dam. . . . . 266-3869

**4. DAM TENDER**

Gordon Brug . . . . . Home 266-5798

**5. NATIONAL WEATHER SERVICE**

Helena . . . . . 449-5204

Great Falls . . . . . 453-2081

**6. CANYON FERRY**

Power Plant Operator (24 hrs.) . . . . . 475-3310

The following telephone numbers are listed for use by the Engineering Bureau.

**7. BROADWATER-MISSOURI WATER USERS ASSOCIATION**

President: Bob Davis . . . . . 266-3786

Vice President: Bob Hensley . . . . . 266-3633

Directors:

Jed Stanfill. . . . . 266-3709

Don Shearer . . . . . 266-3785

Pat Antonick. . . . . 266-3059

Dave Rowland. . . . . 266-4447

Keith Kirscher. . . . . 266-3785

**8. GOVERNOR'S OFFICE . . . . . 444-3111**

Citizen's Advocate . . . . . 1-800-332-2272

**9. FEDERAL ENERGY REGULATORY COMMISSION**

Portland Regional Office

Arthur C. Martin . . . . . Office 503-294-5840

Home 503-635-1472

Harry T. Hall . . . . . Office 503-294-5844

Home 503-636-6861

**10. MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS**

Park Division . . . . . Office 444-3750

Administrator, Don Hyypa . . . . . Home 442-5468

Assistant Administrator, Mason Niblack Home 933-8512

Chief D & C Bureau, Dick Mayer . . . . . Home 442-3925

D & C Projects Manager, Steve Joppa. . Home 443-3035

**11. CENTRALIZED SERVICES DIVISION** . . . . .444-6700  
 Marvin Cutler . . . . . Home 442-8908  
 Jerry Smith . . . . . Home 442-7148  
 John Armstrong, Administrator . . . . . Home 458-9130

**12. WATER RESOURCES DIVISION**

Water Management Bureau . . . . . Office 444-6601  
     Rich Moy . . . . . Home 442-6303  
 Water Development Bureau . . . . . Office 444-6668  
     Rich Brasch. . . . . Home 443-5120  
 Water Rights Bureau . . . . . Office 444-6610  
 Water Rights Field Offices  
     Billings . . . . . Office 8-122-2105,8-122-2911  
         Keith Kerbel . . . . . Home 248-1910  
     Bozeman . . . . . Office 586-3136  
         Scott Compton . . . . . Home 388-4907  
     Glasgow . . . . . Office 228-2561  
         Roy Jones. . . . . Home 228-2667  
     Havre . . . . . Office 265-5516  
         Bob Larson . . . . . Home 265-5626  
     Helena . . . . . Office 444-6695  
         T. J. Reynolds . . . . . Home 227-6850  
     Kalispell . . . . . Office 752-2288  
         Chuck Brasen . . . . . Home 755-6654  
     Lewistown . . . . . Office 538-7458  
         Sam Rodriguez . . . . . Home 538-8680  
     Miles City . . . . . Office 232-6359  
         Walter Rolf . . . . . Home 232-6217  
     Missoula . . . . . Office 721-4284  
         Mike McLane. . . . . Home 251-5425

**13. SOURCES OF AIRCRAFT**

GOVERNMENT AGENCIES

Department of                      Office . . . . . 444-2074  
     State Lands                      Hangar . . . . . 444-4766  
         Rick Burger . . . . . Home 442-9531  
         Pager . . . . . 449-1595  
         Tim Pfahler . . . . . Home 227-8169



## PRIVATE FLYING SERVICES

### Helena

Corporate Air Corporation	Office . . . . .	443-4543
Morrison's Flying Service	Office . . . . .	442-2190
	Jeff Morrison. . .Home	442-8547

### Billings

Billings Deaconess Hospital	Office . . . . .	657-4150
Billings Flying Service	Office . . . . .	248-1741
Corporate Air	Office . . . . .	248-1541
Gillis Aviation	Office . . . . .	252-6355
Lynch Flying Service, Inc.	Office . . . . .	252-0508
Saint Vincent Hospital and Health Center	Office. . . . .	1-800-538-4357

### Bozeman

Central Helicopters, Inc.	Office . . . . .	.586-9185
Johns Flying Service	Office . . . . .	388-3331
Sunbird Aviation Inc.	Office . . . . .	388-4152



## **IV. PREVENTIVE ACTIONS**

### **A. General provisions for surveillance**

Surveillance of the dam will be performed principally by the project operator, with assistance from local citizens, recreationists, Engineering Bureau personnel, county law enforcement personnel, and Department of Fish, Wildlife and Parks personnel. The project operator will be the primary observer; other persons will view the dam when they are in the area. The duties will include observation of dam safety related checklist items including seepage, cracks, settlement, debris, erosion, etc. The ditch rider is normally at the dam once a day during the irrigation season, but not year-round.

The Engineering Bureau makes yearly physical inspections of the dam. An inspection report is written and compared to previous inspection reports. The dam is equipped with post tensioning anchor system monitors, piezometers adjacent to the powerhouse, and a headwater/tailwater level monitoring system.

A Supervisory Control and Data Acquisition (SCADA) system will report power plant alarm conditions to the project operator at a remote location. Dam failure would be detected by headwater/tailwater level monitors. A telephone dialer would notify the project operator of an alarm condition. The operator will make a call to the monitoring system to verify the conditions at the dam and if appropriate, initiate a warning. The operator will initiate the warning by immediately calling the Broadwater County Sheriff's Of-

fice (266-3441), and informing them that the dam may have failed, and that the residents downstream of the dam should be ready to evacuate. The operator will then travel to the dam to visually check the condition of the dam. The Broadwater County Sheriff's Office will be contacted at or from the dam and informed of the condition of the dam.

## **B. Surveillance at remotely controlled or unattended dams**

(not manned on a 24-hour per day basis)

The instrumentation and surveillance is discussed in the above paragraph. Upon receipt of an alarm condition at the immediate response location, the immediate response operator will verify the alarm by calling the SCADA system and if appropriate, notifying the Broadwater County Sheriff's Office (266-3441) of the alarm and then conducting an immediate inspection of the dam. The Engineering Bureau monitors river flows during the spring runoff season via a remote reporting USGS gaging station. The project operator will provide a 24-hour watch when necessary, should a larger than normal spring runoff flow be predicted which may endanger the dam. As a result of the project operator's alarm response and high flow monitoring, any dam failure conditions will be reported to the Broadwater County Sheriff's Office (266-3441) outlined herein.

## **C. Response during Hours of darkness.**

No additional actions can be taken to respond to an emergency situ-

ation or failure at the dam during darkness, inclement weather, or non-business hours than those taken during the regular business hours. The response time will be longer because of the additional time and travel involved in verification, notification and response to an emergency in off hours.

The instructions to the project operator are applicable to hours of both daylight and darkness. Procedures for contacting proper personnel and officials are applicable to hours of both daylight and darkness. Until reports can be verified or proven to be false, a warning shall be given in the interest of public safety. There is a telephone at the dam **(266-3869)** There are two sources of AC power and inverted DC backup system. The spillway bays are air inflated rubber dams which are computer controlled to maintain a constant reservoir level. They can be deflated manually without electrical power. There are overhead lights installed at the dam. The procedures for contacting the proper personnel would be the same as those given in the section "**Potentially Hazardous Situation Is Developing**".

#### **D. Response during periods of adverse weather.**

No additional actions can be taken to respond to an emergency situation or failure at the dam during darkness, inclement weather, or non-business hours than those taken during the regular business hours. The response time will be longer because of the additional time and travel involved in notification and response



to an emergency in off hours. Travel time from Toston to Broadwater Dam is about 15 minutes during good weather.

Access roads to Broadwater Dam and the surrounding area are shown in Appendix F, Figures 1 through 4, pages F-3 through F-6.

Should the main roads become impassable, secondary access to the dam is by a road at the canal crossing, which goes over rough terrain and requires a four-wheel drive vehicle. Figure 4 in Appendix F is a project map that shows the Broadwater-Missouri project in relation to other water projects downstream.

Instrumentation or surveillance systems are installed on the dam. The dam is unmanned, however, dam failure would be detected during adverse weather by headwater and tailwater level alarms. If an adverse condition is found, then the notification would follow the procedures in the sections called "**Failure is Imminent or Has Occurred**" or "**Potentially Hazardous Situation Is Developing**."

#### **E. Availability and use of alternative systems of communication.**

Communication for the initial warning will be by telephone or driving directly to the Sheriff's Office. Once the initial warning is given, the Broadwater County Sheriff's Office can use its radio communication system. DES also has a radio communication system. The Sheriff's and DES's systems do not operate on the same frequency, but the two systems could be used concurrently through the dispatch operator.

F. Emergency supplies and resources

1. Stockpiling of materials for emergency use or repair.

There are no emergency supplies stockpiled at the site. Sources of equipment for use during an emergency are listed below. We can visualize no case in which stockpiling materials or use of equipment could reduce the effect of a dam failure. The processes involved in the destruction of a dam are too powerful to be mitigated by the emergency use of machinery or materials. However, the department will determine if equipment would be useful and will contact the contractors if necessary. The following area contractors have machinery which could be made available in an emergency:

<u>Name</u>	<u>Phone Number</u>
A & W Excavating . . . . .	227-6806
Broadwater County Shop . . . . .	266-3429
Highway Department Maintenance Shop (Townsend). . .	266-5571
Norman Excavating . . . . .	227-6826
Benson Excavation, Inc. . . . .	443-4760
Greenway, Inc.. . . . .	442-5500
Hall Earth Moving . . . . .	443-2245
Helena Sand & Gravel Co. . . . .	442-1185
Highway Department Maintenance Shop (Helena). . .	444-6155
Ingram-Clevenger . . . . .	442-5102
Jim Stout Excavation . . . . .	443-7593
Lasalle Construction Co. . . . .	442-0175
Magille & Son . . . . .	442-5283
Maronick Construction Co. . . . .	442-1185
Valley Excavating . . . . .	458-5110

## 2. Coordination of flows.

Broadwater-Missouri Dam is a diversion dam on the Missouri River. Therefore, runoff forecasts are needed to operate the dam and anticipate any problems that may arise as a result of the high runoff. The Project Section Supervisor, Steve Fry, phone (444-6646) is responsible for communicating with the National Weather Service (449-5204) to obtain runoff forecasts.

As discussed in paragraph C, the spillway bay rubber dams are computer controlled to maintain a constant reservoir level. If the level increases an alarm will be automatically sent to the project operator at a remote location. The project operator can lower the rubber dams manually. The dam does have low level outlets, but the outlet gates are in the closed position and are not operable.

There are some reservoirs upstream of the dam that regulate stream flows.

The dam is a overflow diversion dam; therefore, there is no control over the river flows downstream of the dam.

## 3. Alternative sources of power for spillway gates operation and other emergency uses

The dam is automatically operated. A 100 kV line, a 12 kV line and a battery bank provide electrical power to the operation system. The system will switch automatically between alternate power supplies.

4. Other actions devised to mitigate the extent of possible emergencies.

None are known.

**G. Other concerns and actions.**

None are known.

## **VI. ACKNOWLEDGMENTS**

The Department of Natural Resources and Conservation (DNRC) would like to acknowledge the Department's Engineering Bureau staff for preparing this emergency plan, June Virag and Barbara Lien for the cover design, maps, and layout, and Carole Massman for editing. DNRC also wishes to thank the many individuals and groups who supplied the information contained within it.



## **VI. APPENDICES**



## **APPENDIX A**

# **DESCRIPTION OF BROADWATER-MISSOURI DAM**



# **APPENDIX A**

## **DESCRIPTION OF BROADWATER-MISSOURI DAM**

Broadwater-Missouri Dam is located in Broadwater County about five miles south of Toston, Montana, on the Missouri River (see Appendix F, Figures 1 through 4). The dam is owned by the Montana Department of Natural Resources and Conservation (DNRC) and is operated by the Broadwater-Missouri Water Users Association.

The concrete gravity dam was finished in 1940. It is 40 feet high to the top of the gravity overflow section, and 50 feet high to the top of the retaining wall. The dam is 705 feet wide, with a spillway capacity of 50,000 cubic feet per second (cfs).

Water from the reservoir is delivered to purchasers through a canal system that is owned by DNRC. The Main Canal is 1.5 miles long and has a capacity of 342 cfs; the West Canal is 12.4 miles long and has a capacity of 90 cfs; and the East Canal is 34.3 miles long and has a capacity of 262 cfs. An 84-inch diameter steel pipe flume, 667 feet long, crosses the Missouri River to the East Canal.

Water from the reservoir is used for irrigation.

The areas upstream and downstream of the dam are similar. The river is in a narrow, deep valley both upstream and downstream.



The hills are fairly steep and rock-covered; an occasional rock outcropping can be seen. The valley broadens out about five miles downstream. The Montana Rail Link railroad follows the river on the right bank (looking downstream). A gold mine and the U.S. Bureau of Reclamation Crow Creek Irrigation pumping plant are on the left bank (looking downstream) upstream of the dam. The irrigation canal follows the river on the left bank from the dam until it gets to a division structure. A steel pipe flume carries water across the river to a canal on the right bank, and some water remains in a canal that follows the left bank.

## **APPENDIX B**

# **BROADWATER-MISSOURI POWER PROJECT DAM-BREAK ANALYSIS**



# **APPENDIX B**

## **BROADWATER-MISSOURI POWER PROJECT DAM-BREAK ANALYSIS**

A dam-break analysis was conducted to assess the downstream effect of the flood waves resulting from a hypothetical failure of the Broadwater-Missouri (Toston) Dam. Three scenarios were considered: (1) the dam collapsing during the probable maximum flood (PMF) (150,000 cfs), (2) during the project maximum flood (79,000 cfs), and (3) during the maximum power generation flow of the project (6,000 cfs). Since the tailwater at Broadwater-Missouri Dam during the PMF would reach to about the same level as the headwater, the effect due to dam-break waves would be minimal. Therefore, no further analysis was performed. For the two scenarios studied, effect of dam-break waves, in terms of maximum elevation, maximum flow, travel time, and maximum velocity, were assessed for twenty (20) downstream sections. Eight of these cross sections are shown in Table B-2 on page B-5.

It is important to examine the suitability and applicability of each mathematical model for dam-break wave calculations. Many mathematical models are available to calculate the dam-break waves. A summary of the various models can be found from the proceedings of the Dam-Break Flood Routing Model Workshop organized by the U.S. Water Resources Council, which were published by the National Technical Information Service of the U.S. Department of

Commerce. For the case of Broadwater-Missouri Dam, the model developed by the U.S. National Weather Service's DAMBRK Program was used (Ref. 4).

The breach assumptions and results are summarized in Tables B-1 and B-2 and in Figure B-1.

### **Table B-1**

#### **Breach Assumptions**

Scenario I - Project Maximum Flood at 79,000 cfs

Breach Full Width = 375 ft.  
Spillway Gates Fully Open  
Time to Failure: 0.1 hours  
Time Step Size: 0.5 hours

Scenario II- Power Generation Operation at 6,000 cfs

Breach Width = 375 ft.  
Spillway Gates Fully Closed  
Time to Failure: 0.1 hours  
Time Step Size: 0.5 hours



Table B-2

## Dam-break Analysis Results

## Scenario I - Project Maximum Flood at 79,000 cfs

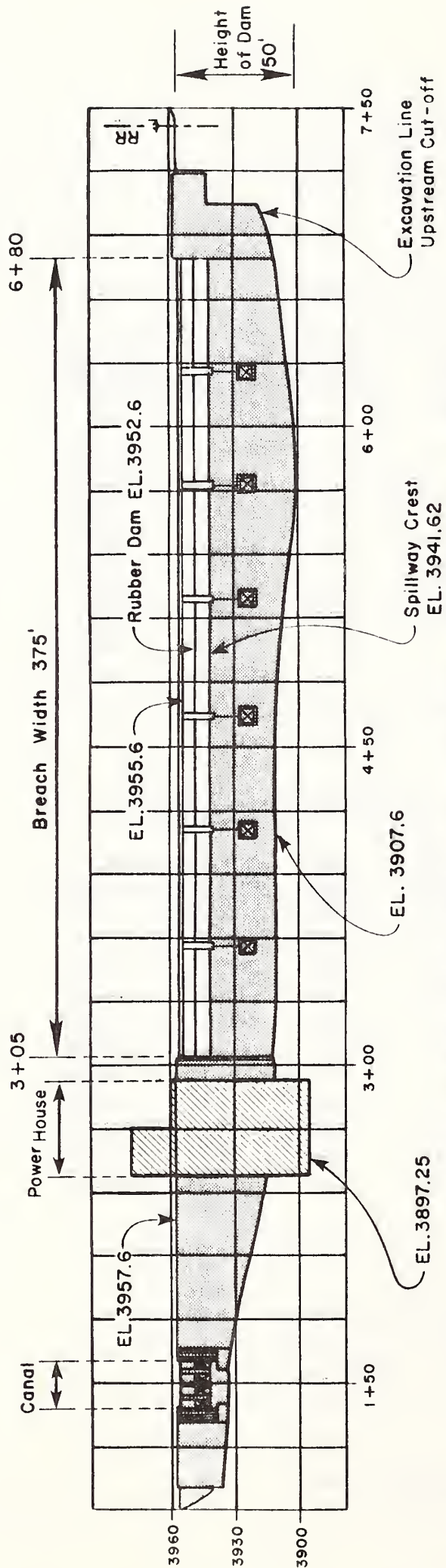
<u>Cross Section</u>	<u>Distance From Dam</u> (miles)	<u>Peak Discharge</u> (cfs)	<u>Wave Velocity</u> (fps)	<u>Travel Time</u> (hours)	<u>Wave Height</u> (ft)	<u>W.S. Elev. Before Failure</u> (ft)	<u>W.S. Elev. After Failure</u> (ft)
DAM	0	134,638	12.00	0.0	9.8	3943.4	3953.2
A	2.1	88,580	10.41	0.1	3.9	3930.4	3934.3
B	5.4	70,594	6.76	0.5	1.2	3908.7	3909.9
C	11.3	62,309	4.51	2.3	0.2	3874.9	3875.1
D	14.9	61,333	3.40	3.6	0.3	3845.8	3846.1
E	17.4	60,704	4.14	4.3	0.8	3837.6	3838.4
F	19.9	62,848	5.36	4.8	0.1	3815.1	3815.2
G	22.3	60,661	2.21	5.6	0.1	3804.8	3804.8
H	23.5	60,711	1.42	5.9	0.1	3803.1	3803.1

## Scenario II - Power Generation Operation at 6,000 cfs.

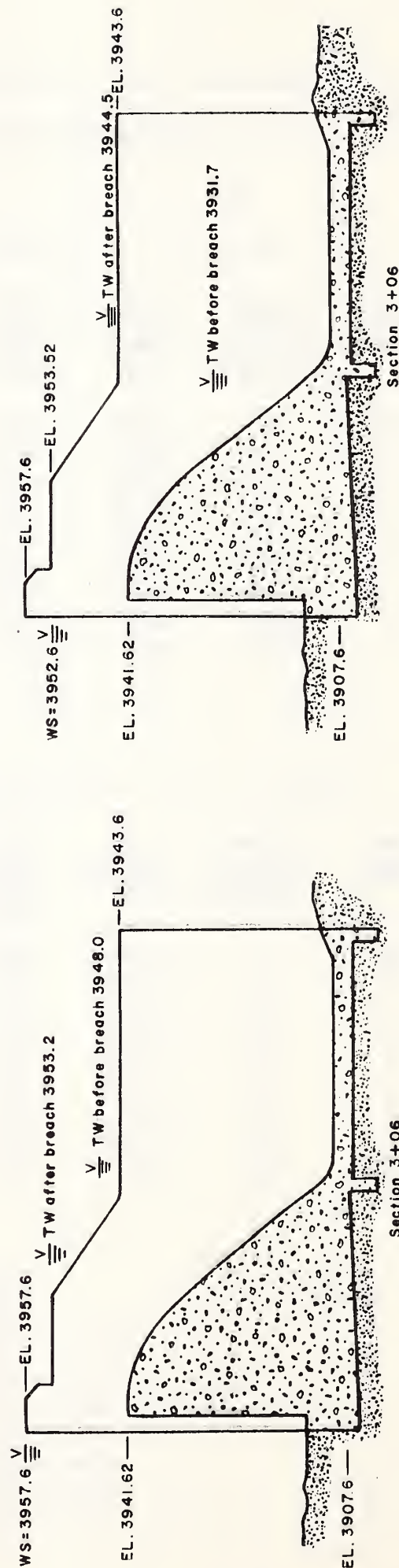
<u>Cross Section</u>	<u>Distance From Dam</u> (miles)	<u>Peak Discharge</u> (cfs)	<u>Wave Velocity</u> (fps)	<u>Travel Time</u> (hours)	<u>Wave Height</u> (ft)	<u>W.S. Elev. Before Failure</u> (ft)	<u>W.S. Elev. After Failure</u> (ft)
DAM	0	94,328	13.00	0.0	12.8	3931.7	3944.5
A	2.1	25,719	7.57	0.3	6.5	3916.1	3922.6
B	5.4	15,216	3.91	1.2	2.4	3899.4	3901.8
C	11.3	10,694	3.04	3.8	1.0	3868.8	3869.8
D	14.9	10,199	2.30	6.7	0.7	3839.2	3839.9
E	17.4	9,547	2.65	6.8	1.1	3829.2	3830.3
F	19.9	9,431	2.76	7.7	0.5	3808.8	3809.3
G	22.3	8,987	1.23	9.8	0.2	3800.5	3800.7
H	23.5	8,787	0.75	10.2	0.1	3797.8	3797.9

<u>Cross Section</u>	<u>Description</u>
A	First house downstream of dam
B	Town of Toston
C	Houses between river and railroad
D	Cemetery
E	Grain bins
F	Townsend
G	Canyon Ferry Reservoir delta
H	Canyon Ferry Reservoir

# FIGURE B-1 BREACH PARAMETERS



## ELEVATION OF THE DAM SHOWING BREACH PARAMETERS NO SCALE



### PROJECT MAXIMUM FLOOD AT 79,000 cfs WATER SURFACE ELEVATIONS

### POWER GENERATION OPERATION AT 6,000 cfs WATER SURFACE ELEVATIONS

## **Conclusion**

The results shown in Table B-2 indicate that the dam-break flood wave created by dam failure during the project maximum flood (79,000 cfs) will attenuate from about 9.8 feet to about 1.2 feet within the first five miles below the dam. During the maximum power generation flow (of 6,000 cfs), the dam-break flood wave will attenuate from 12.8 feet to about 2.4 feet within the first five miles below the dam. At that point the flood wave from both flood conditions varies from 2.4 feet to 0.1 feet until it reaches Canyon Ferry Reservoir. The dam-break flood wave created by dam failure during the project maximum flood and during the maximum power generation flow will have peak discharges at the dam of 134,638 cfs and 94,328 cfs, which will cause flooding as indicated on Figures C-1 through C-6, pages C-3 through C-13, Broadwater-Missouri Dam Flood Inundation Maps.

The failure of Broadwater-Missouri Dam will raise the water surface at the head end of Canyon Ferry Reservoir by about 0.1 feet. This will dissipate to zero by the time that the wave reaches the dam, 25 miles downstream.

## References

1. Fread, D.L., 1984, DAMBRK: the National Weather Service Dam-Break Flood Forecasting Model National Weather Service.
2. Rouse, H. 1950. Engineering Hydraulics. John Wiley and Sons, Inc. New York.
3. Stoker, J. J. 1957. "Water Waves." Inter-Science Pub., New York.
4. Su, S. T. 1977. "Unsteady Flow Analysis of Dam-Break Waves." Proceedings of Dam-Break Flood Routing Model Workshop, Water Resources Council, NTIS P8-275 437.
5. Su, S. T. and A. H. Barnes. 1970. "Geometric and Frictional Effects of Sudden Releases." Journal of Hydraulic Division, American Society of Civil Engineers, HY11. Nov.
6. Tudor Engineering Company. 1982 Broadwater Power Project. License Application to Federal Energy Regulatory Commission.

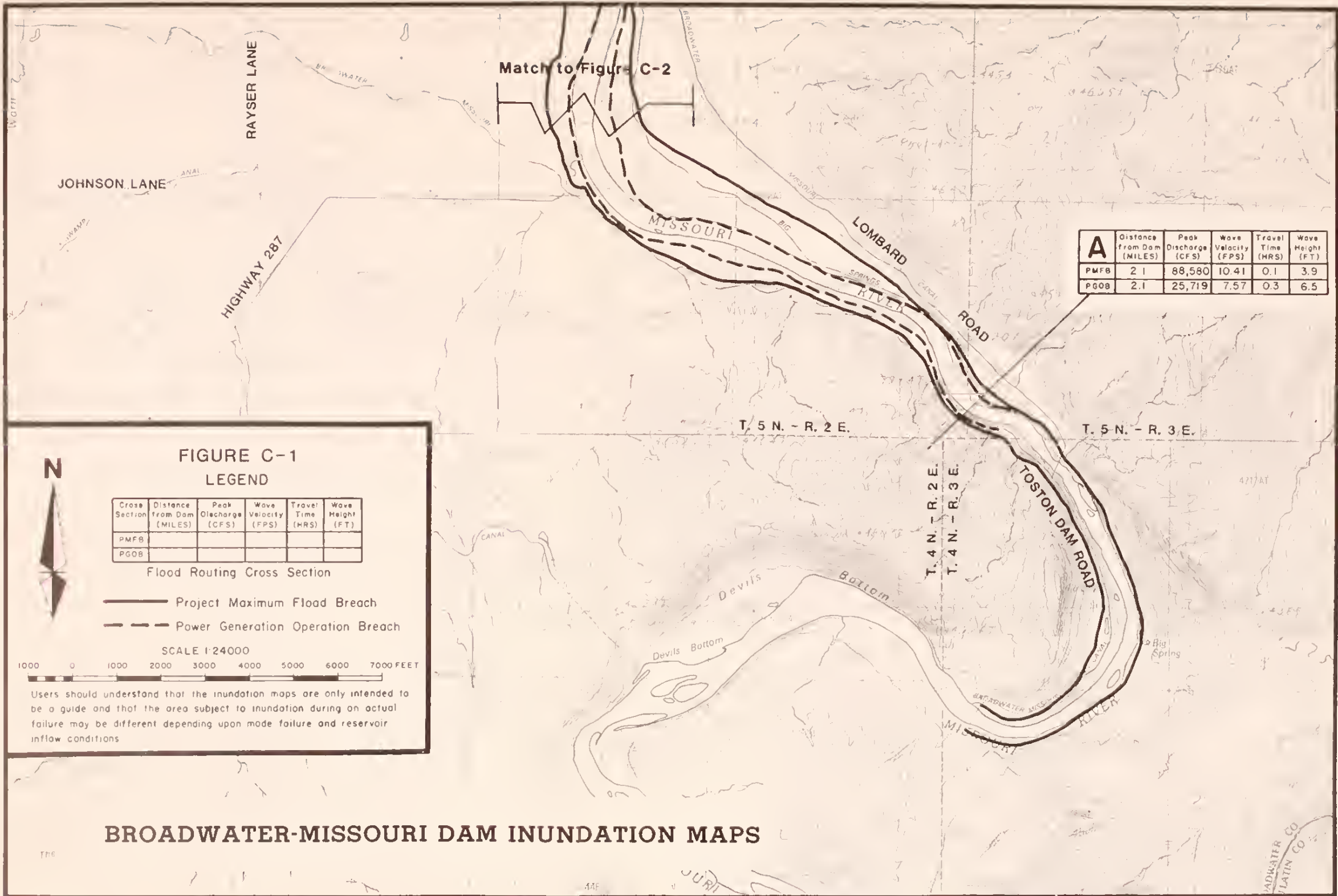
**APPENDIX C**

**FLOOD INUNDATION MAPS**

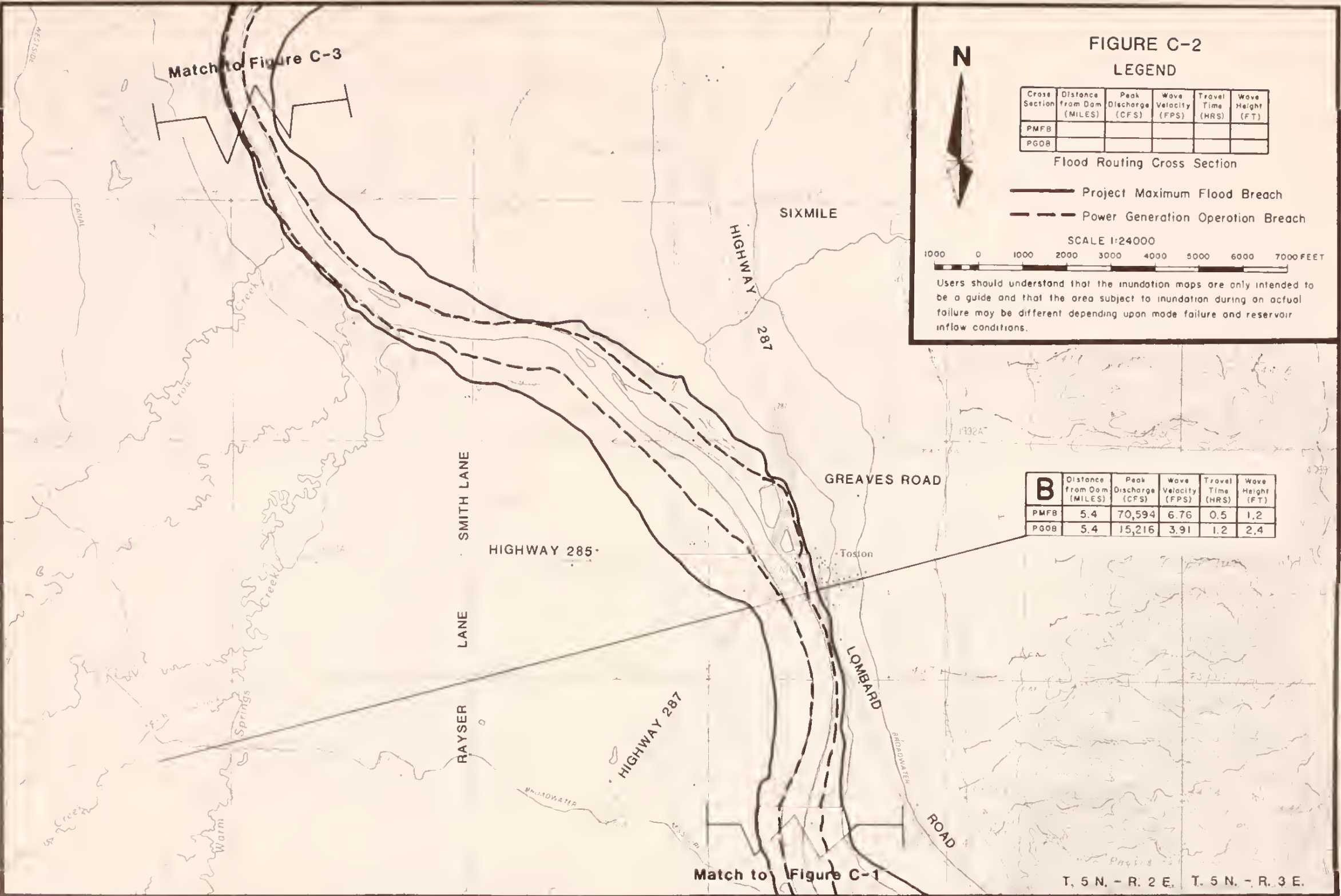










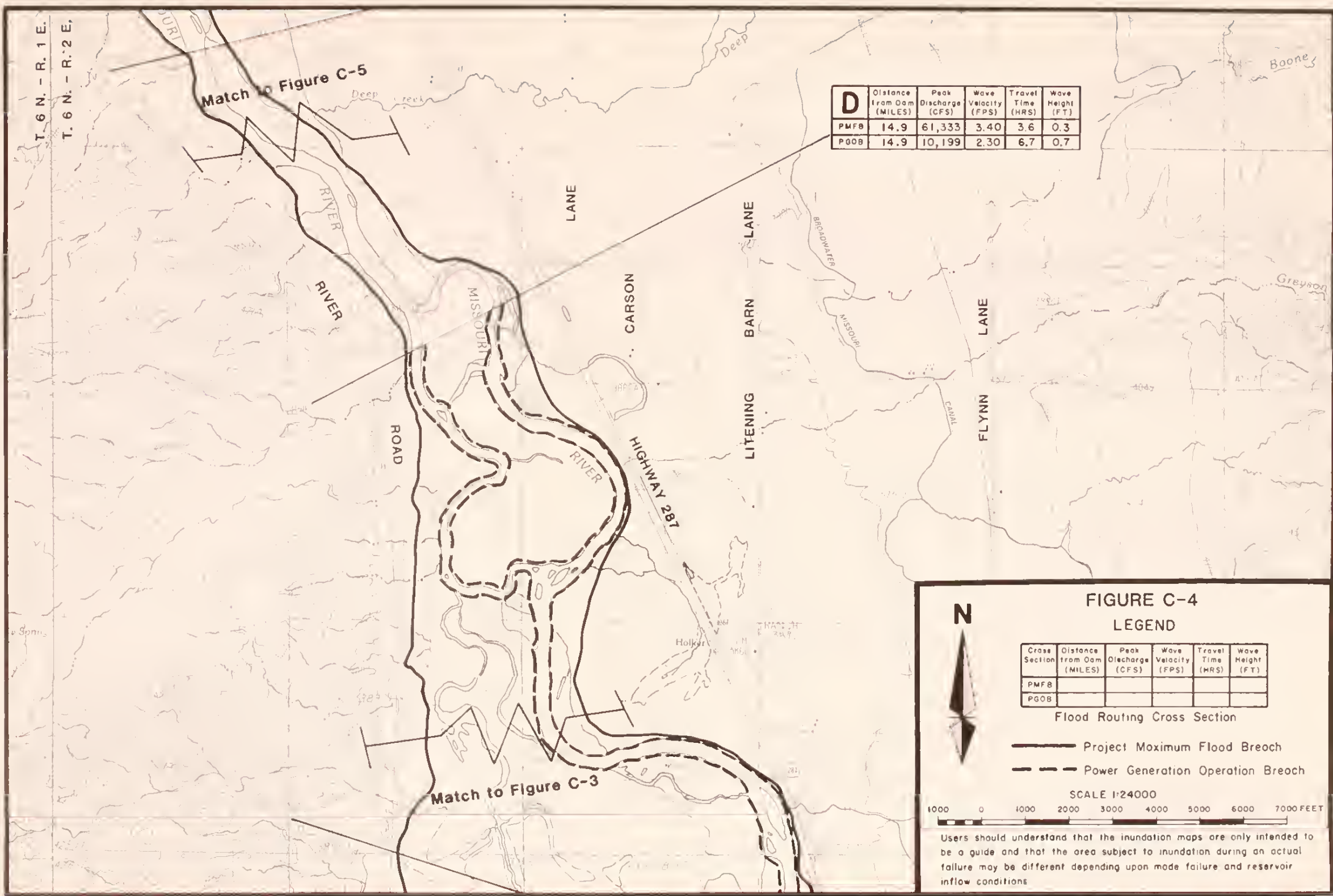






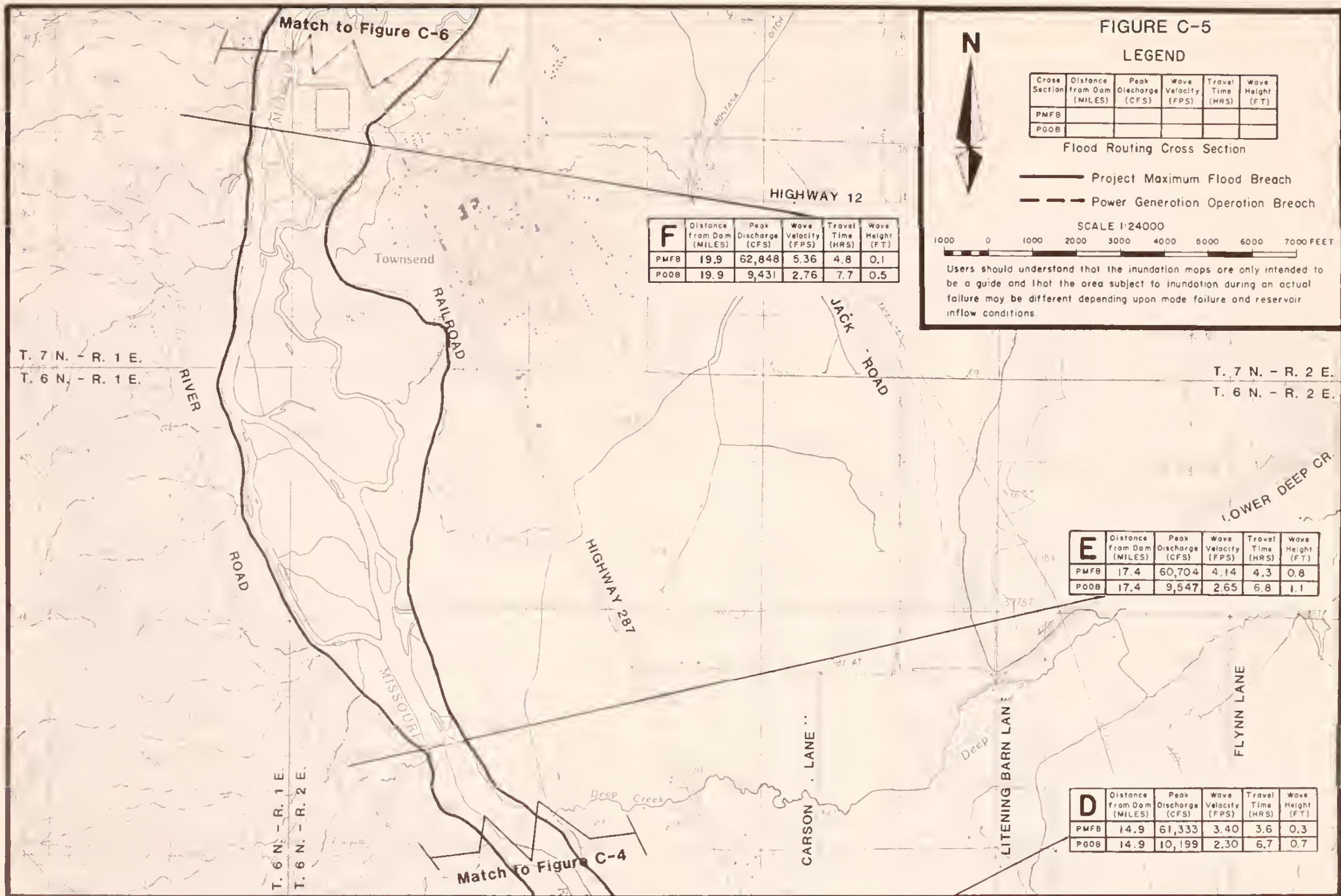






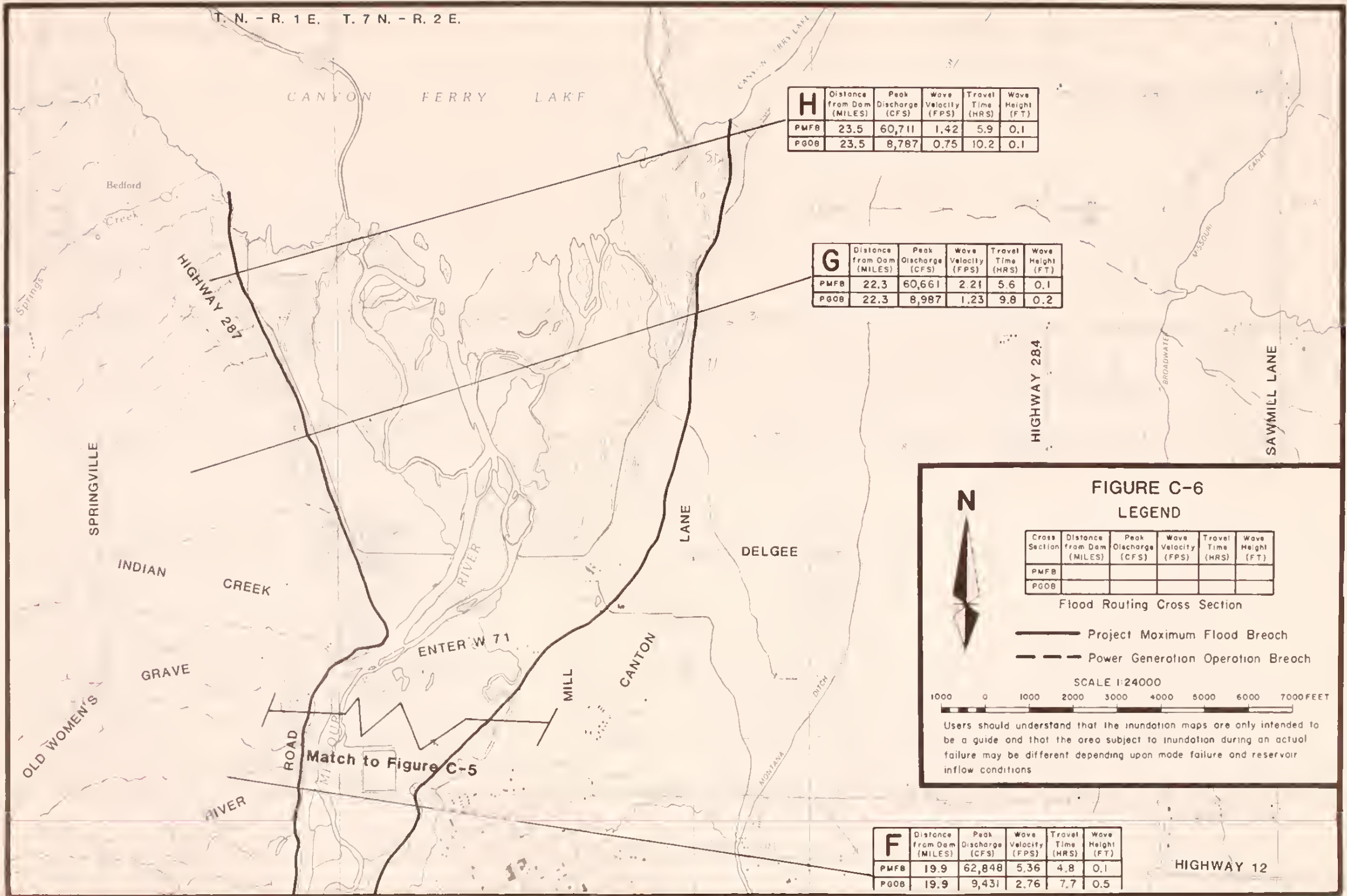












H	Distance from Dam (MILES)	Peak Discharge (CFS)	Wave Velocity (FPS)	Travel Time (HRS)	Wave Height (FT)
PMFB	23.5	60,711	1.42	5.9	0.1
PGOB	23.5	8,787	0.75	10.2	0.1

G	Distance from Dam (MILES)	Peak Discharge (CFS)	Wave Velocity (FPS)	Travel Time (HRS)	Wave Height (FT)
PMFB	22.3	60,661	2.21	5.6	0.1
PGOB	22.3	8,987	1.23	9.8	0.2

HIGHWAY 284

SAWMILL LANE

FIGURE C-6  
LEGEND

Cross Section	Distance from Dam (MILES)	Peak Discharge (CFS)	Wave Velocity (FPS)	Travel Time (HRS)	Wave Height (FT)
PMFB					
PGOB					

Flood Routing Cross Section

- Project Maximum Flood Breach
- Power Generation Operation Breach

SCALE 1:24000



Users should understand that the inundation maps are only intended to be a guide and that the area subject to inundation during an actual failure may be different depending upon mode failure and reservoir inflow conditions

F	Distance from Dam (MILES)	Peak Discharge (CFS)	Wave Velocity (FPS)	Travel Time (HRS)	Wave Height (FT)
PMFB	19.9	62,848	5.36	4.8	0.1
PGOB	19.9	9,431	2.76	7.7	0.5

HIGHWAY 12



**APPENDIX D**

**PLANS FOR TRAINING, TESTING,  
AND ANNUAL REVIEW**





# APPENDIX D

## Plans for Training, Testing, and Annual Review

### 1. POSTING OF THE NOTIFICATION FLOWCHART AND DISTRIBUTION OF THE EAP.

The notification flowchart will be posted at the dam. The nearest public telephone is at the Bunkhouse Bar, which is at Toston. There is a telephone in the construction office at the dam, but it is available only while work is ongoing. The dam tender, Broadwater County Sheriff's Office, and Broadwater County DES Coordinator will have copies of the plan. There is a copy of the plan at the dam construction office.

Copies of the Broadwater-Missouri EAP will be maintained and readily available at:

1. Engineering Bureau Office - Helena
2. Dam Tender's Home
3. Broadwater County DES Coordinator - Townsend
4. Sheriff's Office - Broadwater County
5. Federal Energy Regulatory Commission - Portland Office
6. Broadwater-Missouri Water Users Association

7. Department of Natural Resources and Conservation  
Library
8. State Library
9. State Disaster and Emergency Services - Helena
10. Construction office at the dam

2. Annual training of project operators and other responsible personnel.

DNRC, in cooperation with the local Disaster and Emergency Services coordinator, will conduct a public training session once every 12 months. The purpose of the training session will be to instruct the dam tender, the Broadwater County Sheriff and his deputies, and other Broadwater County officials in what to look for and whom to call, in case of an emergency at the dam. Names and phone numbers of persons to call in case of an emergency will be posted at the dam in the construction office.

3. Annual Review.

The Engineering Bureau will be responsible for reviewing the EAP annually, and updating the plan if there are any changes. The annual review will be made in conjunction with the test of the state of readiness.

4. Test of the state of readiness

A. Review of annual test procedure.

Review of the annual test procedure will be summarized and documented by the Broadwater County DES coordinator, the Engineering Bureau, and the Broadwater County Sheriff.

B. Annual test procedure.

The Engineering Bureau will coordinate the test with the Broadwater County DES coordinator. The DES coordinator will give a message to the dam tender. The message will describe the emergency situation. The dam tender will drive to the dam, read the message, and then proceed with the test. If a failure message is written, he will call the Broadwater County Sheriff, who in turn will call the local DES coordinator and the Engineering Bureau. The local DES coordinator will call the State DES office. The test will stop at that point. If the message indicates an unusual occurrence, the dam tender will call the Broadwater County Sheriff's Office, which will in turn call the Engineering Bureau.

C. Action to be taken.

If the tests indicate that the EAP needs revision, the EAP will be revised by the Engineering Bureau when the yearly revision is done.

D. Who determines if test is successful.

The local DES coordinator will submit a critique of the test to the Engineering Bureau. The Engineering Bureau will determine if the test is successful based upon recommendations received from the local DES coordinator.

E. Submitting test results.

The Engineering Bureau will submit the test results to the Regional Engineer of FERC.

F. Checkpoints.

The following checkpoints will be used to help determine if the test is successful according to FERC requirements.

1. Time dam tender becomes aware of the problem at the dam
2. Time it takes dam tender to make first call to sheriff
3. Time of call to local DES coordinator
4. Time of call to Engineering Bureau
5. Time of call to State DES office

## 5 RECORD OF CHANGES

[illegible]



## 6 RECORD OF TESTS

[illegible]

APPENDIX E  
DOCUMENTATION

Broadwater-Missouri EAP

E-2      Revised 11/1/91

DEPARTMENT OF NATURAL RESOURCES  
AND CONSERVATION



TED SCHWINDEN, GOVERNOR

1520 EAST SIXTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE (406) 444-6699

HELENA, MONTANA 59620-2301

December 7, 1988

Mr. Quentin A. Edson  
Federal Energy Regulatory Commission  
1120 S.W. 5th Ave., Suite 1340  
Portland, Oregon 97204

Re: Project No. 2853 Test of the State of Readiness

Dear Mr. Edson:

On Tuesday, November 15, 1988 the Montana Department of Natural Resources and Conservation held a training seminar on the Broadwater EAP and held a test of the state of readiness. The seminar was attended by personnel from the Department, State and local DES, local sheriffs office and the water users.

The test was successful. The message transmitted was received by all parties within 13 minutes of the original call. A few minor changes were noted in the wording of the message. In general the messages received indicated that the dam had not failed, but action was necessary, and that the dam needed to be inspected. The test pointed to the need for the participants to report the message back to the caller to be sure that the message was understood by the receiver of the call. All participants will be notified of this requirement.

The training session agenda, a list of attendees, the test message and response messages, and the local DES Coordinators critique are attached to this letter.

If there are any questions or comments please contact me.

Sincerely,

*Arthur D Taylor*

for Norman Barnard  
Project Engineer  
Engineering Bureau

BROADWATER-MISSOURI DAM  
TRAINING SESSION AGENDA  
NOVEMBER 15, 1988

I. Introduction

- A. Training purpose
- B. Project History
- C. Reason for the plan
- D. How the plan was developed

II. Explanation of how Plan works

A. Flow Charts

- imminent failure
- stress call Sheriff first
- unusual occurrence

B. Why colored sections

- what they are

Pink - Failure

Yellow - Potentiall hazardous situation

Blue - Telephone Directory

White - Supplementary information-Appendix

- mitigation
- flood maps
- breach information
- dam safety problems

III. Testing of the Warning Plan

- A. Who is involved
- B. Duties of those involved
- C. How the test works





*Big Sky Country*

## DISASTER & EMERGENCY SERVICES DIVISION

RAYMOND J. DOGGETT, COORDINATOR  
BROADWATER COUNTY  
P. O. BOX 489  
TOWNSEND, MONTANA 59644  
406-266-5214 or 406-266-3443

RECEIVED

NOV 18 1988



MONT. DEPT. of NATURAL  
RESOURCES & CONSERVATION

November 17, 1988

Art Taylor  
Toston Dam Safety Engineer  
Department of Natural Resources and Conservation  
1520 East Sixth Avenue  
Helena, Montana 59620-2301

RE: Toston Dam

Dear Mr. Taylor:

On November 15, 1988, the Department of Natural Resources, Broadwater County Disaster and Emergency Services, Broadwater County Sheriff's Office, Broadwater Missouri River Users Association and the Montana Disaster and Emergency Services had a meeting on the Toston Dam Emergency Plan. This meeting was on the flow chart for the emergency plan for the dam.

Attending this meeting were sheriff deputies and dispatchers and dispatchers from the local D.E.S. department. Art Taylor presented the Plan and the flow chart to those attending and an exercise was conducted on the flow chart.

I believe the test was educational and certainly pointed out some of the areas that need reviewed. The local officials were pleased with the testing and would like to have more tests conducted as the project progresses.

Sincerely,

Raymond J. Doggett

RJD:jd



**RAYMOND J. DOGGETT, COORDINATOR  
BROADWATER COUNTY  
P. O. BOX 489  
TOWNSEND, MONTANA 59644  
406-266-5214 or 406-266-3443**

[illegible]

C J IN

ADMINISTRATIVE MESSAGE

SENDING AGENCY: BROADWATER COUNTY DISASTER & EMERGENCY SERVICES

RECEIVING AGENCY: TOSTON DAM TENDER

ATTENTION: DAM TENDER

RE: TOSTON DAM EMERGENCY PLAN TESTING

MESSAGE IS AS FOLLOWS:

~~There has been a large earthquake in the area of Toston Dam. The dam has cracked in the second bay from the canal. Water is leaking through the crack. The bridge in this bay has failed but the dam has not failed.~~

COORDINATOR: Raymond J. Doggett

AGENCY: Broadwater County DES

AUTH: Raymond J. Doggett



①  
Test - Broadwater Missouri (Toston) Dam - Test  
Call back #                      & Name

1223 Bob Davis - 246 - 3786 - 1/2 hr so.  
ences

Large earthquake. in area of Toston Dam  
Cracked in 2nd bay from the canal  
Water leaking thru crack.

Bridge in this bay has failed; but the dam  
has not failed -

Exercise - end of msg.

1228 5214 Ray no answer  
3443 10-6 Judy  
3937 Home

1228 221 Paged twice

1230 557 43-12 call Treas. Office give Doris the msg.  
(Ray at House she will stop by -

1230 Doris Hosfeld contacted & msg. delivered

1234 444-6646 Richard Bondy - Lunch

Test msg - who do I contact?

Neg. contact. ~~but~~ She wants him

She will get me another engineer.

1237 She found Bondy -

1238 msg. delivered - He ~~will~~ 'would' advise me  
that he would make his contacts then come over & start  
evacuation process.

Continued  
reporting from Broadwater Co. Local  
DES for Ray Deggett.

Reported at  
12:30 PM  
11/15/88 from

(2) Bob Davis reported to us that ~~the~~ Dispatch  
there was a large earthquake at the  
Toston Dam. It has cracked the  
second bay from the canal. Water  
is leaking thru the bridge  
and the bay failed but the dam  
has ~~not~~ not.

Reported to Homer Young State DES  
444-6911 @ 12:29 11/15/88

Davis  
Bob 12:29 P / Homer  
11/15 / Young  
Lg earthquake  
Cracked 2nd  
Bay from canal  
Water leaking thru  
Bridge in this Bay  
failed but dam has  
not.



Message received at 12:29 <sup>at 12:29</sup>

1:20 PM. From Van Lieberg St. DES to Jim  
Anderson - DES Dist III REP.

An earthquake has damaged  
the torton dam, water  
leaking thru the bridge, dam  
was not failed.

Ex. Mas.

1:20 PM From Van Lieberg  
State DES.

④  
Rick Bondy's Message

Ginny Rutherford Broadwater Shifts Office  
at 12:40

Bob Davis called 12:25 Large Earthquake

Crack in second Bay

Bridge gone

Dam not yet failed

Department and/or Agency

SIGN-OFF SHEET

By my signature, I acknowledge that I, or my representative, have reviewed this Plan, and agree to the tasks and responsibilities assigned herein for my department and/or agency. It is furthermore understood that I, or my representative, will review, and as necessary, upgrade that Emergency Action Plan as it relates to our designated responsibilities, on an annual basis.

BROADWATER COUNTY

DISASTER AND EMERGENCY SERVICES

Raymond J. Pozgett  
Signature

9/16/87  
Date

BROADWATER COUNTY

SHERIFF'S DEPARTMENT

Richard E. Thompson  
Signature

9/16/87  
Date

BROADWATER COUNTY

BROADWATER COUNTY COMMISSIONERS

Thomas H. Hurley  
Signature

Sept. 21 - 87  
Date

Walter Ray Doig  
Signature

Sept. 21 - 1987  
Date

Bruce L. Linder  
Signature

Sept. 21 - 87  
Date

# **APPENDIX F**

## **LOCATION MAPS**





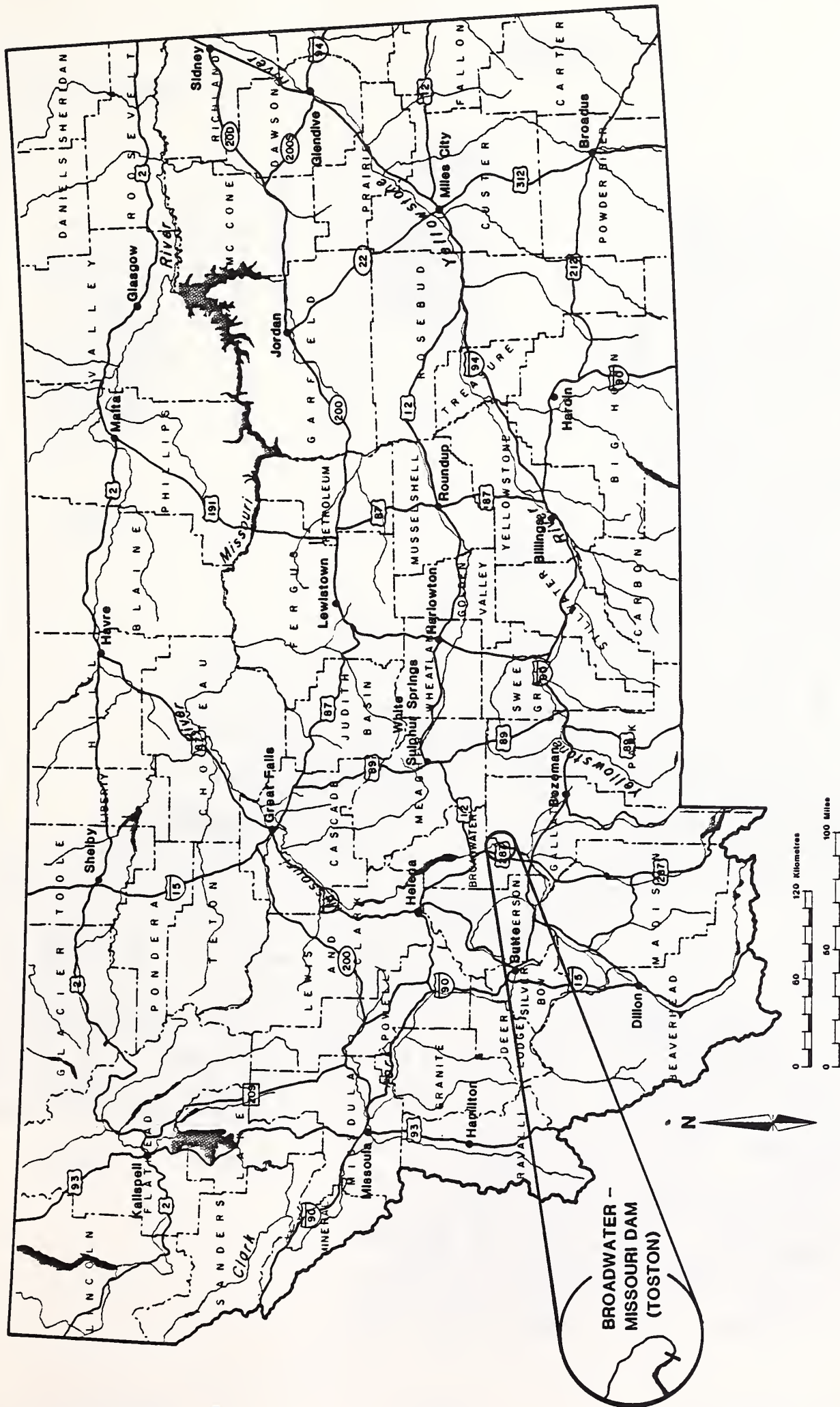


Figure 1. Broadwater-Missouri Dam Location

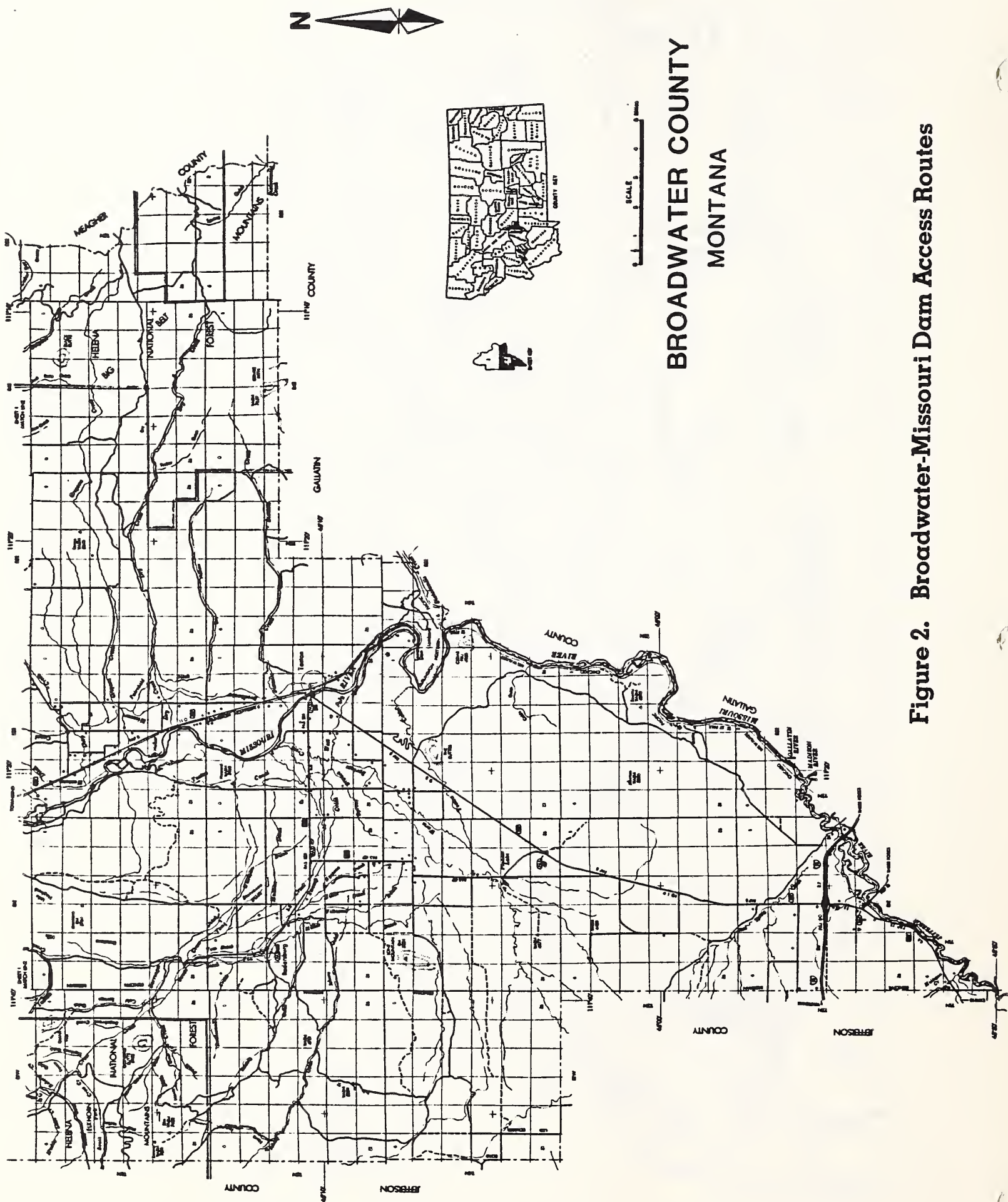
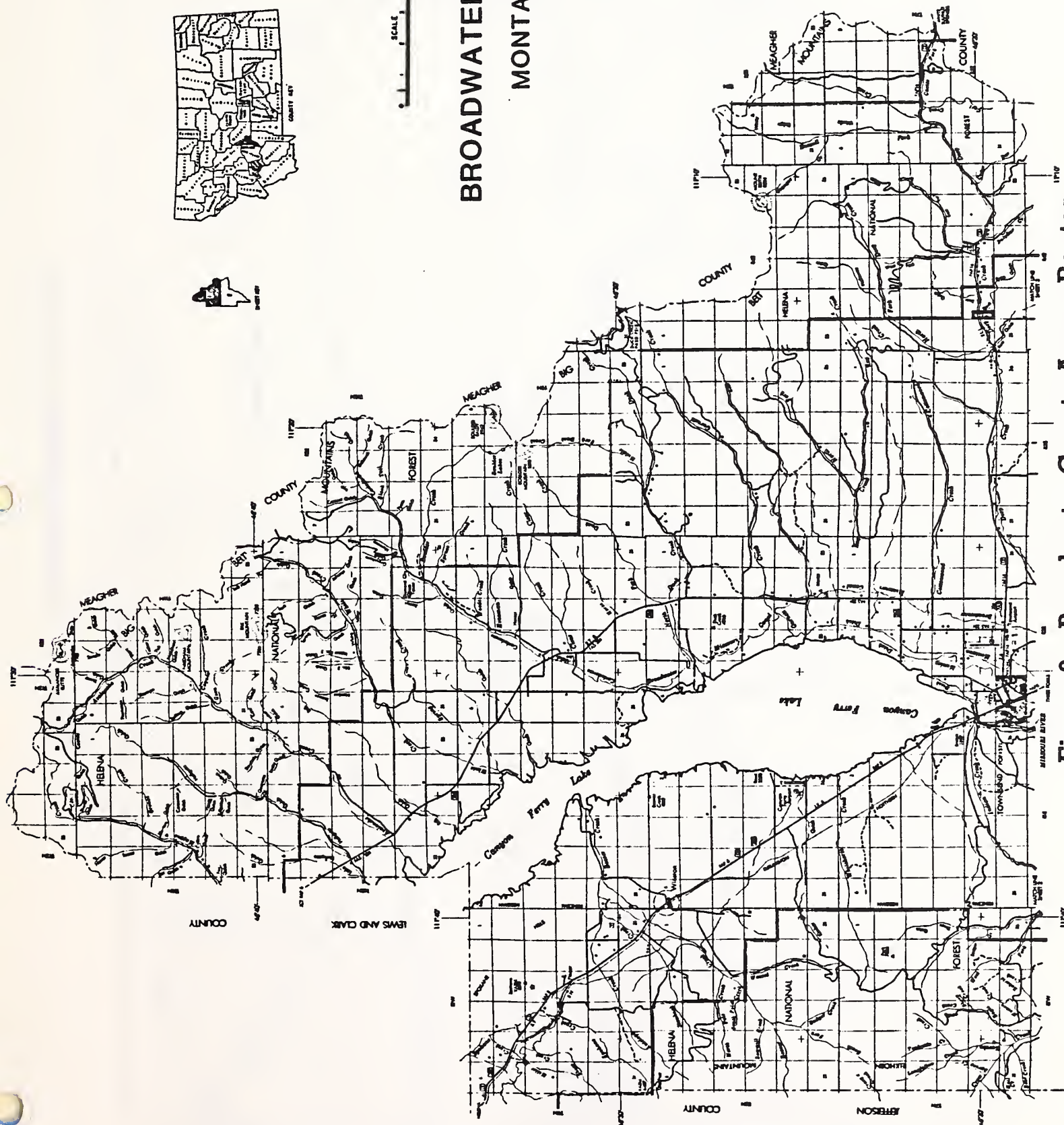


Figure 2. Broadwater-Missouri Dam Access Routes





### Figure 3. Broadwater County Access Routes

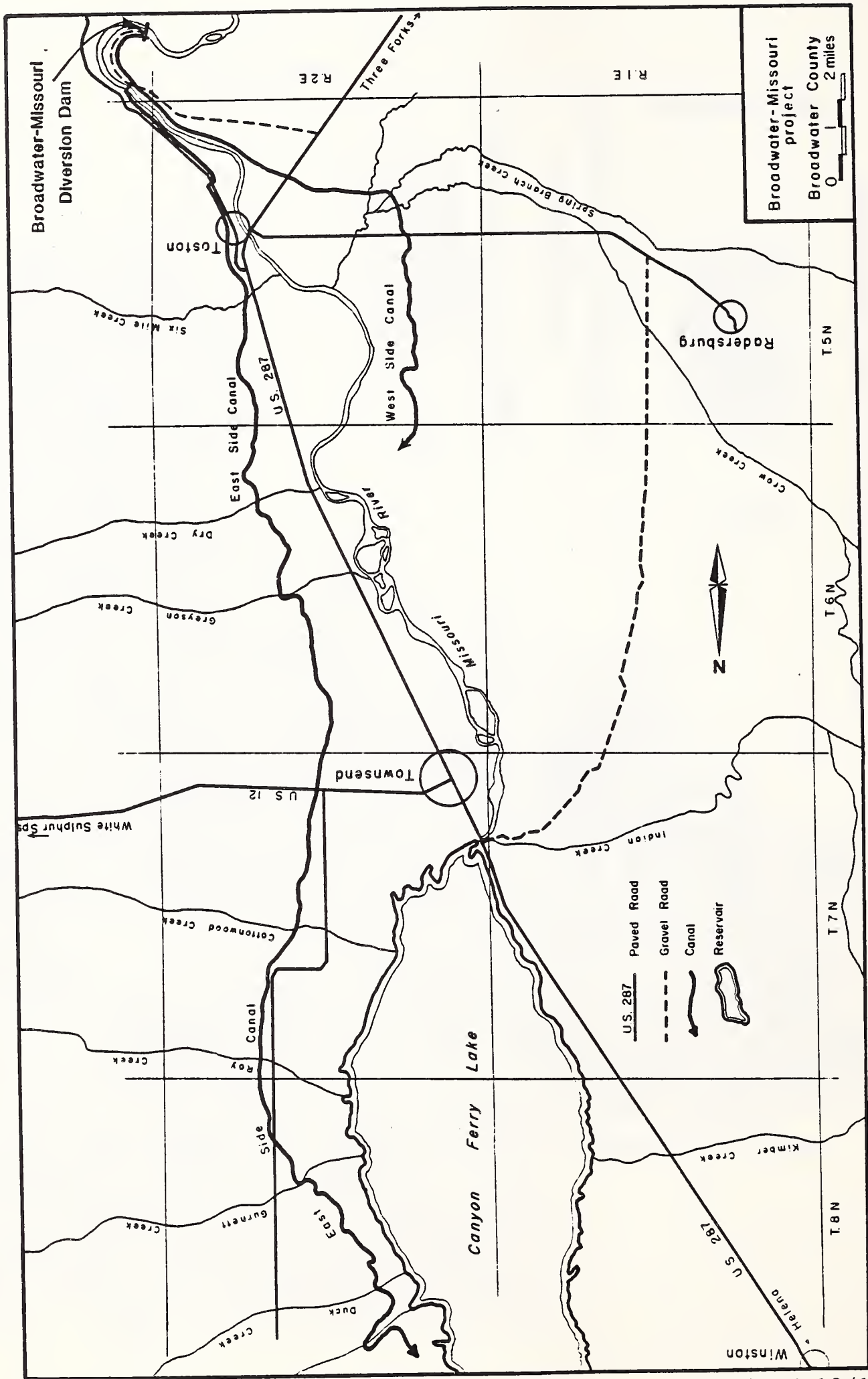


Figure 4. Broadwater-Missouri Project

**APPENDIX G**

**TELEPHONE DIRECTORY**



## APPENDIX G

### TELEPHONE DIRECTORY

The telephone numbers are listed in order of priority.

1. SHERIFF

Broadwater County. . . . . 266-3441

2. DISASTER AND EMERGENCY SERVICES

Broadwater County. . . . . Business 266-3441

Mike Wenzel . . . . . EOC 266-5214

Home 266-3220

Church 266-4219

Montana Disaster and Emergency Services

Division (Helena) . . . . . 444-6911

3. MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION (DNRC)

Power Plant at the dam . . . . . 266-3869

Auxiliary number (FAX) 266-3817

Chatter Box 266-4454

Engineering Bureau . . . . . Office 444-6646

Bureau Chief: Richard Bondy. . . . . Home 442-5763

Supervisor, Walt Anderson . . . . . Home 443-3016

Plant Superintendent, Mike Sims . . . Home 442-0552

Pager 449-1550

Plant Operator, Brian Carroll . . . . Home 266-4212

Pager 449-1549

Plant Operator, Jim Beck. . . . . Home 266-3026

Supervisor, Project Rehabilitation Section:

Glen McDonald . . . . . Home 443-5758  
Dam Safety Engineer: Arthur Taylor . Home 443-0315  
Civil Engineer: Robert Clark . . . . Home 227-7046  
Civil Engineer: John Sanders . . . . Home 443-0243

Supervisor, Project Section:

Mel McBeath . . . . . Home 933-5556  
Water Resources Division . . . . . Office 444-6601  
Administrator: Gary Fritz . . . . . Home 443-3631  
Assistant Administrator: Robin Harper . Home 227-5982  
Assistant Administrator: Laurence Siroky Home 442-2806  
Civil Engineer: Mike Oelrich . . . . Home 449-5668  
Civil Engineer: Gary Fischer . . . . Home 442-8818  
Department Director . . . . . Office 444-6699  
Karen Barclay . . . . . Home 449-7174  
Deputy Director: Wayne Wetzel . . . . . Home 227-6419  
Information Officer: James Bond . . . . . Office 444-6743

4. DITCH RIDER

Gordon Brug . . . . . Home 266-5798

5. NATIONAL WEATHER SERVICE

Helena . . . . . 449-5204  
Great Falls . . . . . 453-2081

6. Canyon Ferry

Power Plant Operator (24 hrs.) . . . . . 475-3310

7. BROADWATER-MISSOURI WATER USERS ASSOCIATION

President: Bob Davis . . . . . 266-3786

Vice President: Bob Hensley . . . . . 266-3633

Directors:

Jed Stanfill. . . . . 266-3709

Don Shearer . . . . . 266-3785

Pat Antonick. . . . . 266-3059

Dave Rowland. . . . . 266-4447

Keith Kirscher. . . . . 266-3785

8. GOVERNOR'S OFFICE . . . . . 444-3111

Citizen's Advocate . . . . . 1-800-332-2272

9. FEDERAL ENERGY REGULATORY COMMISSION

Portland Regional Office

Arthur C. Martin . . . . . Office 503-326-5840

Home 503-635-1472

Harry T. Hall . . . . . Office 503-326-5844

Home 503-636-6861

## 10. SOURCES OF AIRCRAFT

<u>Name</u>	<u>Phone Numbers</u>
<hr/>	
GOVERNMENT AGENCIES	
<hr/>	
Department of	Office . . . . . 444-2074
State Lands	Hangar . . . . . 444-4766
Rick Burger . . . . .	Home 442-9531
Summer Fire Dispatch . . . . .	444-4242
Tim Pfahler . . . . .	Home 458-5136

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### PRIVATE FLYING SERVICES

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#### Helena

Corporate Air	Office . . . . . 443-4543
Corporation	
Morrison's Flying Service	Office . . . . . 442-2190
	Jeff Morrison. . . Home 442-8547
3-D Aviation	Office . . . . . 449-2369
Wolf Aviation	Office . . . . . 443-1225

#### Billings

Billings Deaconess Hospital	Office . . . . . 657-4000
	1-800-325-1774
Billings Flying Service	Office . . . . . 248-1741
Corporate Air	Office . . . . . 248-1541
Lynch Flying Service, Inc.	Office . . . . . 252-0508

Saint Vincent Hospital and  
Health Center

Office. . . . 1-800-538-4357

Bozeman

Central Helicopters, Inc.

Office . . . . . 586-9185



<u>PROBLEM</u>	<u>HOW TO EVALUATE PROBLEM</u>	<u>EMERGENCY ACTION</u>	<u>DATA TO BE REPORTED AND NOTIFICATION</u>	<u>PROBABLE CAUSE/REMARKS</u>
6. FAILURE OF RIPRAP OR OTHER SLOPE PROTECTION	<p><u>Not serious</u>—if erosion is minor and pool is at a low level.</p> <p>Could lead to failure—if riprap damage is severe at low- or high-pool levels.</p>	<p>Repair work to be coordinated with Engineering Bureau.</p> <p><u>Repair using stockpiled riprap.</u> Riprap may be dumped directly into the erosion scarp. The smaller stones will tend to settle to the lower portion of the stone mass, essentially creating a protective filter over the embankment soil. The readjustment of stones in this method requires that the dumped stone section be constructed thicker than the original riprap section.</p> <p><u>Use of in-place riprap.</u> If stockpiled riprap is used up, and if the pool level is not expected to rise, in-place riprap from higher slope elevations may be used in an emergency.</p> <p><u>Temporary repair using sand bags.</u> If stockpiled riprap is depleted, sandbags may be placed in the scarped area. Each bag should be filled with sand and tied. Placement should be by hand, sling, or other methods that would prevent tearing of the bags. Bags filled with clay and silt should be used only if sand is not readily available and other methods of repair cannot be implemented.</p> <p>None required.</p>	<p>Elevation of damage; length of damage, in feet; pool elevation when damage occurred. Notify Engineering Bureau.</p>	
7. EROSION FROM RUNOFF	<u>Not serious</u> —if surface runoff does not enter existing cracks or is not concentrated at abutments.		Location of erosion and approximate depth of gulley. NOTIFY Engineering Bureau.	Check for erosion at left abutment contact.

<u>PROBLEM</u>	<u>HOW TO EVALUATE PROBLEM</u>	<u>EMERGENCY ACTION</u>	<u>DATA TO BE REPORTED AND NOTIFICATION</u>	<u>PROBABLE CAUSE/REMARKS</u>
7. EROSION FROM RUNOFF (cont'd.)	Could lead to failure—if surface runoff enters existing cracks during high pool level or is concentrated at the abutments.	Coordinate necessary repair work with Engineering Bureau.	Location of erosion, approximate depth of gully and elevation, pool elevation. NOTIFY Engineering Bureau and Sheriff's Office.	
B. BURROW HOLES	<u>Not serious</u> —if holes do not penetrate completely through the embankment.	Backfill as deep as possible with impervious material. If the dam becomes infested with burrowing animals, trepping or poisoning will be necessary.	Location and total number, above or below water and approximate depths. NOTIFY Engineering Bureau.	If holes penetrate through embankment, problem should be considered serious. Dike section should be checked frequently. Several areas of burrows have been previously noted.
9. GATE FAILURE e. Control Gate	<u>Not serious</u> . Additional gate shutdown available.	Lower emergency gate. Check for superstructure deformations. (para. 10).	Report data as directed. NOTIFY Engineering Bureau.	Mechanical malfunctioning.
b. Control Gate & Emergency Gate.	<u>Could lead to failure</u> . Additional gate shutdown available. However, consider problem serious if superstructure deformation is noted (see para. 10).	Close wicket gates; lower draft tube stop logs. Check throughout outlet works for structural deformation. Check <u>all</u> dam safety problems.	NOTIFY Engineering Bureau and Sheriff's Office.	Substructural deformations due to settlement, slides, or earth tremors.
c. Control Gate & Emergency Gate.	<u>Could lead to failure</u> . No additional gate shutdown available. Consider problem extremely serious if superstructure deformation is noted (see para. 10). A rapid piping condition could exist.	Immediate downstream notification should begin. Check <u>all</u> dam safety problems, especially slides and seepage in the area of the right abutment.	NOTIFY County Sheriff, local DES, and Engineering Bureau.	Same as above.
10. STRUCTURAL DEFORMATIONS a. Control Tower—settlement, tilt, etc.	<u>Not serious</u> . Minor movement noted with instrumentation or other stationary guide reference.	Observe at more frequent intervals to determine if motion is progressing.		Superstructure deformation as well as substructural motion possible.
	<u>Could lead to failure</u> . If misalignments result in gate failure (para 9b and 9c); extreme subsurface motion could lead to additional problems of piping, etc., along the conduit exterior.	Set intake stoplogs if time permits. Check <u>all</u> dam problems in vicinity of abutments. Begin lowering pool.	NOTIFY Engineering Bureau and Sheriff's Office.	Substructural motion.

<u>PROBLEM</u>	<u>HOW TO EVALUATE PROBLEM</u>	<u>EMERGENCY ACTION</u>	<u>DATA TO BE REPORTED</u>	<u>PROBABLE CAUSE/REMARKS</u>
10. STRUCTURAL DEFORMATIONS (cont'd.)	Failure Imminent. Severe surface structural deformation and uncontrolled release of water is evident between a break in the joint of gate structure and conduit.	Begin Emergency notification.	Notify County sheriff, local DES and Engineering Bureau.	
b. Spillway motion.	<p><u>Not serious.</u> Minor movement noted by instrumentation and other stationary guide references.</p> <p><u>Serious.</u> At elevated reservoir stages and spillway structures at imminent failure.</p>	<p>Observe at more frequent intervals to determine if motion is progressing.</p> <p>Begin emergency notification plan immediately downstream.</p>	Notify Engineering Bureau	Superstructural deformation as well as substructural motion possible.







